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Occupational Outlook for College Graduates

1974-75 Edition

U.S. DEPARTMENT OF LABOR
Bureau of Labor Statistics
1974

Bulletin 1786

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Occupational Outlook for College Graduates

1974-75 Edition

U. S. DEPARTMENT OF LABOR
Peter J. Brennan, Secretary
BUREAU OF LABOR STATISTICS
Julius Shiskin, Commissioner
1974

Bulletin 1786



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Preface

In our rapidly evolving economy, farsighted career planning is becoming increasingly essential to college students desiring a rewarding career. As the economy continues to expand and change, creating different kinds of jobs, career planning will become more difficult. The *Occupational Outlook for College Graduates* is a guide to career opportunities in a broad range of professional and related occupations for which a college education is, or is becoming, the usual educational background for employment. It provides occupational information for students attending or planning to attend college, as well as their counselors, teachers, and parents. In addition to discussing the outlook, each occupational statement presents information on the nature of the work, places of employment, education and training requirements, earnings, and working conditions. Also presented are a brief summary of the expected changes in the Nation's economy and an analysis of the overall supply and demand situation for college graduates through the mid-1980's.

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I. HOW THIS BOOK IS ORGANIZED

This chapter describes the contents and organization of the *Occupational Outlook for College Graduates*. It tells how the information was assembled and discusses a number of points that need to be kept in mind while interpreting the occupational statements that make up the main body of the book. It also gives suggestions regarding supplementary sources of occupational information and tells how readers can keep up to date on developments affecting the employment outlook in different occupations.

The second introductory chapter describes some of the most important occupational and industrial employment trends—and their relationship to college graduates—to provide a background for interpreting the reports on individual occupations.

OCCUPATIONAL OUTLOOK STATEMENTS

The occupational statements that follow the two introductory chapters are reprinted from the 1974–75 edition of the *Occupational Outlook Handbook*. These reports are grouped into 10 “clusters” of occupations: Office occupations; service occupations; education and related occupations; sales occupations; occupations in transportation activities; scientific and technical occupations; health occupations; social science occupations; social service occupations; and art, design, and communications related occupations.

These career clusters help relate the outlook materials to college curriculums and occupational training programs, career ladders and lattices, and fields of interest for college or potential college students engaged in career exploration and planning. The clusters are based on a concept of related activities. Physicians, for example, are in the same cluster as hospital administrators and all other health employees. Within some of these career clusters, occupations are further grouped into related subfields. For example, within the office occupation cluster, there are groups for administrative and related occupations, computer and related occupations, and insurance occupations.

The occupations discussed in this volume generally are those of greatest interest to college students and graduates, and include those for which a college education is required, is becoming increasingly necessary, or is the usual educational background for employment. Occupations covered include workers in professional and related occupations, sales occupations, managerial and administrative occupations, and service occupations. The statements in this publication account for about 95 percent of all workers in professional and related occupations, and for smaller proportions of workers in other major groups. About three-fifths of all college graduates work in professional and related occupations; smaller proportions are in other major occupational groups.

To help readers locate information on the occupations in which

they are interested, a detailed list of the occupational reports by field of work is provided in the table of contents at the front of the book. The occupations covered in the *Occupational Outlook for College Graduates* also are coded according to the occupational classification system developed by the U.S. Department of Labor and published in the *Dictionary of Occupational Titles*. This *Dictionary* provides a code number (D.O.T. number) for each occupation included in it; the code number can be used as a filing system for occupational information. The code numbers of the D.O.T. are listed in parentheses immediately below the main occupational statement headings.

Sources of Information

Information on employment trends and outlook, and on the many related topics discussed in the occupational reports, was drawn from a great variety of sources. Interviews with hundreds of experts in industry, unions, trade associations, and public agencies provided a great deal of up-to-date information. The Bureau's other research offices were a further source; they supplied data on employment in different industries, productivity and technological developments, wages and working conditions, trade union agreements, industrial hazards, and a number of other topics. Additional data regarding the nature of the work in various occupations, training and

licensing requirements, earnings, and employment trends were provided by other agencies of the Federal Government—among them, the Bureau of Apprenticeship and Training and the U.S. Employment Service, Manpower Administration, Department of Labor; the Bureau of the Census, Department of Commerce; the Office of Education and the Vocational Rehabilitation Administration, Department of Health, Education, and Welfare; the Civil Service Commission; the Interstate Commerce Commission; the Civil Aeronautics Board; the Federal Communications Commission; the Department of Transportation; and the National Science Foundation. Many other public and private organizations—educational institutions, business firms, professional societies, trade associations, and trade unions—also made available published data and supplied much helpful information through interviews.

After the information from these many sources was compiled and analyzed in conjunction with the Bureau's overall economic model, conclusions were reached as to prospective employment trends in the various occupations. In addition, estimates were made of the numbers of job openings that will be created by retirements and deaths and transfers out of each occupation. The supply of new workers likely to be available in a particular field also was analyzed by studying statistics on high school and college enrollments and graduations as well as data on the number of reentries and transfers into an occupation.

Preliminary drafts of the occupational reports were reviewed by officials of leading companies, trade associations, trade unions, and professional societies, and by other experts. The information and conclu-

sions presented in each report thus reflect the knowledge and judgment not only of the Bureau of Labor Statistics staff but also of leaders in the field discussed, although the Bureau, of course, takes full responsibility for all statements made.

Readers wishing more information on the sources and methods used to analyze the occupational outlook in different fields of work should consult the technical appendix of the *Occupational Outlook Handbook, 1974-75 Edition*, BLS Bulletin 1785.

Points to Bear in Mind in Using Occupational Statements

The information contained in the individual sections of each occupational statement follows a standard format under the headings: Nature of work; places of employment; training, other qualifications and advancement; employment outlook; earnings and working conditions; and sources of additional information. In using the *Occupational Outlook for College Graduates* it is important to keep in mind the purpose for which the information was designed. Also, because of imperfect data sources, the limited length of each occupational statement, and many other factors, each of the sections has its own unique limitations. The following describes the information in each of the sections including its purpose and its limitations.

The *Nature of the Work* section of each occupational statement describes the major job duties performed by a worker in the occupation. It is intended to show young people what the worker does and how he or she does it.

Each statement describes a typical job. However, job duties may vary by factors such as employer, size of the employing organization, geographic location of the job, and other variables.

In some occupations, individual workers specialize in certain tasks. In others they perform the entire range of work in the occupation. Specialization can be illustrated in the field of medicine; doctors usually specialize because of the amount of skill and knowledge required to function in each area.

Occupational skill requirements continually change along with changes in technology, industrial processes, and products. Analysts who prepare the occupational statements attempt to include information on the latest changes but because of the rapidity of technological improvement and innovation in some fields of work all developments are not covered.

The *Nature of the Work* section of each occupational statement is most valuable when used with other information in the statement. The descriptions of the nature of the work may lead one to other information that is important to job satisfaction. For example, the descriptions of some jobs indicate that the work is done outdoors. Information on other jobs indicates that the worker sits indoors at a desk most of the time. Many of these job characteristics are described further in the section on working conditions.

The *Places of Employment* section provides information on the number of workers in an occupation and, when data are available, on the proportion of women and part-time workers. Industries that are major employers are discussed and the geographic concentration of employment in an occupation is noted.

The Places of Employment section is designed to provide readers with information on the quantitative importance of the occupation in the economy, as well as to alert readers to potential incompatibilities between the occupation and their personal preferences. For example, the data in the Places of Employment section can indicate that because of the geographic distribution of employment it may be difficult to live near family and friends or in a particular climate and at the same time have good employment prospects. However, data in the occupational outlook statements indicate that employment in most occupations is widespread enough so that career choices usually need not be changed because of geographical considerations.

This section also highlights other factors affecting occupational choice that are generally explained in more detail in other sections of the statement. For example, when the employment size of two occupations is significantly different, the larger occupation usually will have more annual job openings because of the large number of workers who die or retire each year. The need to fill job openings that result from persons leaving the labor force accounts for about one-half of all openings. In addition, occupations employing a high proportion of women generally have relatively higher numbers of annual job openings than occupations employing predominantly men because many women leave the work force to have children and raise families.

The *Training, Other Qualifications, and Advancement* section is designed to inform the reader about the type of education and training needed for entering an occupation, and about the requirements for ad-

vancement to higher levels. It is important to be aware of the type of training required because it is often necessary to start early in one's college career to plan courses toward the goal.

The Training, Other Qualifications, and Advancement section generally presents the minimum level and type of education required for the various occupations and the preferred background for entry. In many cases, alternative ways of attaining required training are also listed. Also provided is information on college courses or major fields of study that are of particular help in preparing for the occupation.

Although people with different educational backgrounds may be able to enter an occupation, the level of entry and speed of advancement are often determined by the amount of education and training. For example, a high school graduate with clerical skills can enter the medical record field as a clerk and receive about a month of on-the-job training. A graduate of a 2-year medical record technician course at a community college can begin his or her career at the technician level as a supervisor of several clerks. The graduate of a 4-year medical record librarian course may enter the medical record profession as the head of the medical record department in a hospital. The chance that the person who starts as a clerk will, after years of experience, be head of the department is very small, and as more trained people enter the labor force, the chance to advance without academic training to the highest positions in any occupation becomes more remote.

In an effort to protect the public, there are State certifications or licensing requirements for some occupations to assure that the workers are qualified. The *Occupational*

Outlook for College Graduates provides information to help young persons become aware of any special requirements that exist in a specific occupation. Physicians and nurses are examples of professionals who must pass State board exams for licensing. Elementary and secondary school teachers must successfully complete a specified list of courses among their college subjects, depending on the grade level and subject matter they plan to teach. Also, the courses required for a teacher's license differ from State to State. Persons preparing for an occupation that requires State licensing should, therefore, become familiar with the information on licensing for the occupation that is presented in the occupational outlook statement and then obtain specific information on the requirements in the State or States in which they plan to work. This information will help in gearing courses so the requirements can be met.

When one decides on an occupation, the "continuing education" that will be required in order to reach the desired level in the occupation is as important a consideration as the initial education requirement. Persons who see themselves as college presidents and begin working as assistants to the registrar after receiving their bachelor's degree should be prepared to spend several years in graduate school. Once the requirements necessary to advance to the desired level of the chosen occupation are determined, individuals should decide whether they have the natural talents and personal qualities needed, and whether they are willing to put in the time and effort to meet those requirements. If formal education is involved, will the employer pay for it, and if not, can the employee af-

ford the cost? Also, individuals must decide whether they have the academic ability to complete the education.

In addition to the education, training, and other requirements necessary both to enter the occupation and to reach the desired position, another essential factor in career choice is the correlation of specific personal characteristics with the characteristics of the job. To provide this information, the statements present typical job characteristics for each occupation. This allows individuals to match their unique qualifications, "likes," and "dislikes" to the job. This is not an easy task, since it is often difficult for young persons to assess themselves. Tests which help individuals assess their personal characteristics can be very valuable.

Listed below are some of the job characteristics described in the occupational outlook statements and the relevant personal characteristics.

Responsible decisions required—Individuals should be able to make important decisions and to exercise good judgment.

Motivates others — Individuals should be able to influence the behavior of others.

Directs the activity of others—Individuals should have supervisory skills.

Work is closely supervised—Individuals must feel comfortable in a situation where work performance is controlled closely by a supervisor.

Highly competitive—Individuals should be able to face the pressures of competing with others on the job for recognition and achievement.

Works with ideas—Individuals should have the ability to think in abstract terms to solve work-related problems.

Works with people—Individuals should have pleasant personalities

and the ability to get along with others in face-to-face relationships.

Works with objects—Individuals should have manual skills and some physical coordination.

Works independently—Individuals should have initiative, self-discipline, and organizational ability.

Works as part of a team—Individuals should have the ability to interact effectively with fellow employees in performing duties.

Opportunity for self-expression—Individuals should have creative talents and the ability to utilize their own ideas in practical ways.

Opportunity to see physical results of work—Individuals should derive satisfaction from seeing their work produce a tangible product.

Works with detail—Individuals should enjoy working with technical data, numbers, or written materials on a continuing basis.

Generally is confined to a work area—Individuals should feel comfortable performing their work at one setting.

Work is repetitious—Individuals should be comfortable performing the same task on a continuing basis.

Exposed to weather conditions—Individuals should enjoy working outside, and should not be averse to exposure to weather and temperature extremes.

Helps people—Individuals should enjoy assisting people in a helping relationship.

The *Employment Outlook* section informs students and counselors of prospective job opportunities and is, therefore, one of the major aids that young people can use to evaluate the career potential of the occupations they find interesting. However, the prospect of relatively few job openings should not prevent someone from pursuing a particular career. Those who know

their own interests, and have discussed their abilities and aptitudes with their counselor, should not forego a potentially rewarding career only because the outlook in that occupation is less favorable than in other occupations. Even in occupations with relatively poor prospects, jobs are available because of the need to replace workers who leave the occupation; on the average, job openings resulting from replacement of workers who leave the occupation account for about one-half of all openings.

Outlook information can be very useful to someone who has great interest in a cluster of occupations requiring similar interests, abilities, and educational backgrounds. A student who has become interested in sales occupations, for example, can compare the job prospects for real estate, insurance, and manufacturers' salesmen and select the one or two offering the best opportunities.

Information about the outlook in an occupation is very difficult to develop. No one can predict future labor market conditions with perfect accuracy. In every occupation and industry, the ratio between the number of jobseekers and the number of job openings constantly changes. A rise or fall in the demand for a product or service affects the number of workers needed to produce it. New inventions and technological innovations create some jobs and eliminate others. Changes in the size or the age distribution of the population, work attitudes, training opportunities, or retirement programs determine the number of workers available. As these forces interact in the labor market, some occupations experience a shortage, some a surplus, some a balance between applicants and openings. Methods used by

economists to develop information on future occupational prospects differ, and judgments which go into any assessment of the future also differ. Therefore, it is important for users of the *Occupational Outlook for College Graduates* to understand what underlies each statement on outlook.

The keys to understanding the outlook sections are the economic assumptions used in developing projections of future needs. Two of the assumptions that underlie the statements on employment outlook are that high employment levels will be maintained and that no cataclysmic events will occur, such as a war or a severe and prolonged economic depression. Such catastrophes would, of course, create an entirely different employment situation from that likely to develop under the assumed conditions. But young people would find it impossible to build their lifetime plans in expectation of such unpredictable events, although, on the basis of historical experience, they must be prepared to weather economic ups and downs during their working lives. The basic economic assumptions are discussed in detail in the next chapter, *Tomorrow's Jobs for College Graduates*.

In making employment projections, all possible factors should be taken into account. Nevertheless, not all factors can be quantified or themselves projected. For this reason, outlook information is generally presented as a qualitative statement about growth in an occupation. Opportunities will usually be favorable in occupations in which employment increases over time along with the growth of the economy; those occupations that are expected to remain constant or decline generally have less favorable prospects than the average occupation.

The adjectives used to describe changes in employment requirements correspond to the ranges of percent change, as shown in the accompanying tabulation:

<i>Adjective</i>	<i>Increase or decline</i>
Very rapid	40.0 percent or more
Rapid	30.0 percent to 39.9
Moderate	15.0 percent to 29.9
Slow	5.0 percent to 14.9
Little or no change	0 percent to 4.9

For some occupations, it also is possible to make estimates of the future supply of workers. These are usually in professional occupations where the paths of entry are rather limited, and which therefore allow a statistical assessment based on trends in the number of persons pursuing specific types of education or training and entering the occupation related to the training. When supply estimates as well as demand estimates have been made, the occupational outlook statements contain a qualitative statement of job opportunities corresponding to the prospective demand-supply relationship, as follows:

<i>Job opportunities</i>	<i>Prospective demand-supply relationship</i>
Excellent	Demand much greater than supply
Very good	Demand greater than supply
Good or favorable	Rough balance between demand and supply
May face competition	Likelihood of more supply than demand
Keen competition	Supply greater than demand

The *Occupational Outlook for College Graduates* discusses the outlook for the Nation as a whole. Job prospects in many local areas, however, may not correspond to those for the entire Nation. In using the national statements, therefore, young people should discuss with counselors the employment prospects in the particular areas in which they would like to live. Information on the local outlook is

often available from local offices of State employment security agencies.

The *Earnings* section helps answer many questions persons ask when choosing a career. Will the income be high enough to maintain a desired standard of living? Is the pay high enough to justify the education and training costs? How much will a worker's earnings increase as he or she gains experience? In what localities are the best paying jobs in the occupation?

What are earnings? To most people the word "earnings" means money—a paycheck in the mailbox or cash in the pocket. Money, however, is only one kind of financial reward for work. Paid vacations and free lunches are also part of the total earnings package. There are three kinds of earnings—cash, fringe benefits, and payments in kind.

Cash. In 1972 more than 90 percent of all American workers received cash for their work in the form of a *wage* or *salary*. A wage or salary is usually a "flat rate"—a certain amount of money for a specific period of time at work. A wage is usually an hourly or daily rate, and a salary is a weekly, monthly, or yearly rate. Most craftsmen, factory workers, and laborers earn wages, and most professional, technical, and clerical workers earn salaries. Salary workers usually know how large their pay checks will be each week or month, which makes budgeting easier. Wage workers' earnings may be different each week, depending on how many hours they work.

Both wage and salary workers receive *overtime* pay, but this is more common for wage workers. Overtime rates and the standard work-

week (the number of hours worked before overtime is paid) vary from job to job. Many employees are covered by the Fair Labor Standards Act, which requires overtime pay at 1½ times the hourly rate for more than 40 hours' work a week. For many workers overtime pay is a relatively large part of their total earnings.

Workers assigned to night shifts or other irregular hours often receive extra pay per hour, called a *shift differential*.

Earnings take a variety of forms besides the familiar flat rate plus overtime. Waiters and waitresses get most of their earnings in *tips* from customers. Salesmen may receive a *commission*—a percent of the amount of their sales. Factory workers are sometimes paid a *piece rate*, a certain payment for each item they produce. Tips, commissions, piece rates, and other kinds of pay are often combined with flat-rate wages and salaries.

Almost 10 percent of all workers in 1972 were in business for themselves and earned *self-employment income* instead of wages or salaries. Self-employment income takes an almost endless variety of forms. Farmers, shopkeepers, and other small businessmen receive money selling their products. Doctors and lawyers collect fees from their clients. Writers sell short stories to magazines or receive royalties from publication of their books.

Some occupations offer the chance to earn income in addition to regular wages and salaries. For example, college professors are paid for publishing independent research.

Fringe benefits. In addition to cash, most American workers receive a variety of indirect payments, or *fringe benefits*, ranging from paid holidays to life insurance. The im-

portance of fringe benefits has increased tremendously since World War II; by 1970 they accounted for nearly one-fifth of the total earnings package in private industries other than farming.

Several fringe benefits received by a majority of workers are required by Federal and State law. They include social security, workmen's compensation, and unemployment insurance. These benefits provide payments to workers when they are no longer employed because of old age, work-related injury or disability, or lack of suitable jobs.

Among the most common fringe benefits are paid time off for vacations, holidays, and sick leave. Some workers also receive time off, usually without pay, for jury duty, military service, and maternity leave.

Some additional fringe benefits help protect the worker's income if he is injured, sick, unemployed, or retired. These include life, health, and accident insurance, retirement plans, supplemental unemployment benefits, and severance pay. The costs of insurance and retirement are often shared by the worker and employer.

Some employers also offer stock options and profit-sharing plans, saving plans, and bonuses.

Payments in kind. In addition to cash and fringe benefits, some workers receive part of their earnings "in kind" as goods or services. Earnings in kind may include room and board, laundered uniforms, meals, company housing, business expense accounts, or free airline tickets. These items should be considered earnings because they are worth money and come with the job.

Which jobs pay the most? Comparing the earnings in different occupations is not easy, mainly because

good information is available only for one category of earnings—wages and salaries. For some occupations even this information is not available. Nevertheless, the *Occupational Outlook for College Graduates* provides some types of comparisons in many occupational statements. Generally, these are comparisons with the average earnings of all non-supervisory wage and salary workers in private industry other than farming, which is the broadest average of earnings data available in current statistics.

Earnings variations. Within each occupation there are many levels of pay. Earnings vary with the worker's experience, location, industry, and type of work, and this information is provided, when possible.

Experience. Beginning workers nearly always earn less than experienced workers. In most occupations, workers move up a career "ladder" to higher pay and generally do more responsible work as they gain experience. Some ladders have only one or two steps; in some occupations, the ladders have many steps, and some even offer a choice of several different kinds of work with different levels of pay.

A typical career ladder is the one faced by beginning engineers. The average annual salary for beginning engineers with a B.S. degree was \$10,800 in 1972. As beginners gain experience, they do more complicated work with less supervision and their responsibilities and earnings increase. Four years after graduating from college, engineers earned an average salary in 1972 of \$13,200; those who had graduated 10 years earlier earned about \$16,000. If the opportunity comes along they may move to a higher paying position as a supervisor.

Location. In many occupations earnings will vary with the location of the job. For example, public secondary school teachers in 1972–73 averaged \$10,460 a year. However, 11 states (Alaska, New York, California, Michigan, Illinois, New Jersey, Maryland, Minnesota, Arizona, Nevada, and Connecticut) paid average annual salaries of \$11,000 or more, and three (Mississippi, Arkansas, and Idaho) paid secondary school teachers less than \$8,000 a year.

The variations in the earnings of engineers and teachers, however, do not tell much about such variations in other occupations. Although there are some general national patterns of earnings differentials, each occupation has its own geographical pattern, and each occupation must be studied for its own. Young people using this publication also should check with counselors and local employers to find out about specific earnings in local areas.

Industry and type of work. Workers in most occupations can find jobs in different industries, sometimes doing different types of work. Because the job market is not exactly the same in each situation, they can expect their pay to vary according to whom they work for and what they do on the job.

The earnings of engineers, for example, vary considerably by industry. With 5 years of experience, those in the electronic equipment industry averaged \$15,000 in 1972; those in construction and consulting, \$13,600; those in the Federal Government, \$14,650; and those in State governments, \$12,550.

The salaries of Ph.D. chemists show how earnings may vary by type of work. (See table 1.) In 1972 chemists in management jobs earned \$6,700 more than those in

research and development. Chemists in marketing and production earned \$400 less than research and development chemists, but \$4,300 more than teachers.

Table 1. Average annual salaries of chemists with Ph.D. degrees, by type of work, 1972

Type of work	Annual salary
Management	\$26,300
Research and development ...	19,600
Marketing and production ...	19,200
Teaching	¹ 14,900
Other	18,300

¹ Salary for 9-month academic year.

SOURCE: American Chemical Society.

The Working Conditions section provides information that can be most important to an individual's job satisfaction because preferences for working conditions vary considerably among individuals. Some people, for example, have a preference for outdoor work while others prefer working in an office. Some people like the variety of shift work; others want the steadiness of a 9-to-5 job. Proper consideration of working conditions can contribute greatly to job satisfaction and success.

The *Occupational Outlook for College Graduates* discusses many aspects of working conditions that are of concern to individuals who are looking into their prospective careers. The following are several types of working conditions, with their implications, that are discussed in the occupational statements when they apply.

Overtime work required—When overtime is required, employees must give up some of their free time and should therefore be flexible in their personal lives. Overtime, however, provides the opportunity to increase earnings.

Shift work—Evening or night work

is part of the regular work schedule in some jobs. Employees are, therefore, usually working while most other people are off. Shift work may be preferred by some individuals who want to pursue certain daytime hobbies such as hunting, fishing, gardening, etc.

Environment—Work settings vary from clean air-conditioned offices to places that are dirty, greasy, or poorly ventilated. With this knowledge, workers can avoid jobs that may submit them to unpleasant conditions.

Outdoor work—Those who work outdoors may be exposed to weather extremes. It may be preferred over indoor work, however, by those who consider outdoor work more healthful.

Hazards—In some jobs, employees are subject to possible burns, cuts, falls, etc., and must attend to proper safety precautions.

Physical demands—Some jobs require standing, stooping, kneeling, or working in cramped positions. Physical strength and stamina may be required, and those without such attributes should be careful in selecting such jobs.

Persons planning their careers should also consider how working conditions may change in an occupation as they progress up the career ladder. Workers may find that promotion depends on adjusting to working conditions other than those they had planned on. For example, a young person may enter a particular occupation because outdoor work is appealing, and be disappointed to learn that the next levels of the career ladder are desk jobs.

Sources of additional information. People using the *Occupational Outlook for College Graduates* may want more detail on the occupation described in the individual reports, or information on fields of work that are not covered. Suggestions as to sources of additional information are given in most of the occupational reports.

OTHER BLS PUBLICATIONS USEFUL IN CAREER GUIDANCE

In addition to this publication, the Bureau of Labor Statistics issues the *Occupational Outlook Handbook*, a basic tool in the vocational guidance of young people seeking a field of work. The Bureau also issues a periodical, the *Occupational Outlook Quarterly*, to keep readers up to date between editions of the *Handbook* and the *Occupational Outlook for College Graduates Quarterly* articles discuss developments affecting employment opportunities and report the findings of new occupational outlook research. In addition the Bureau issues, at irregular intervals, occupational outlook bulletins that give much more detailed information on various fields of work than can be included in either the *Handbook* or the *Quarterly*.

The Bureau has also developed a visual aid for counselors consisting of a set of color slides that show the changing occupational and industrial mix, and trends in manpower development, education, and training. The slides, which have an accompanying narrative, are available directly from Bureau of Labor Statistics regional offices.

The Bureau will be glad to place the name of any user of the *Occupational Outlook for College Grad-*

uates on its mailing list to receive announcements of new publications and releases summarizing the results of new studies. Those wishing to receive such materials should send the request, with their address, to the Bureau of Labor Statistics, U.S. Department of Labor, Washington, D.C. 20212.

Other Bureau of Labor Statistics publications that are useful to counselors can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, or from Bureau of Labor Statistics regional offices listed on the inside back cover. A list of these publications, along with descriptions of their contents, follows:

EMPLOYMENT AND EARNINGS. A monthly periodical featuring timely analyses of current developments in employment, unemployment, hours, and earnings for the Nation. Contains statistics on employment, earnings, hours of work, and labor turnover by industry for the Nation and by industry division for each State and for 202 metropolitan areas. Also contains detailed statistics on the labor force, including characteristics of the employed and unemployed such as age, marital status, color, industry, and occupational attachment.

MONTHLY LABOR REVIEW. The *Review* contains articles that can help counselors keep abreast of the changing social, economic, and demographic scene. In addition to providing a statistical section on labor force and employment, labor turnover, earnings and hours, consumer and wholesale prices, and work stoppages, the *Monthly Labor Review* publishes special articles by experts on subjects such as the impact of technological change on employment, occupational counseling, and manpower planning.

SPECIAL LABOR FORCE REPORTS. Reports based on special surveys of the labor force are issued several times a year. They include statistics and analyses of selected characteristics of the labor force, such as educational attainment, employment of school dropouts and recent high school graduates, work experience during the year, and marital and family status. Published in the *Monthly Labor Review*, which may be available in school libraries. Reports are available free as long as supplies last from the Bureau of Labor Statistics, U.S. Department of Labor, Washington, DC 20212, or from its regional offices.

AREA WAGE SURVEYS. These bulletins include figures on average earnings and employment in selected occupations and in major industries and labor market areas. Weekly working hours for some groups of workers and customary practices regarding pensions, vacations, holidays, and sick leave are also reported. Areas for which bulletins are published and prices are listed in the *Directory of Area Wage Surveys*, which may be obtained free from the Bureau of Labor Statistics.

SOURCES OF ADDITIONAL ASSISTANCE

Other sources likely to be helpful in providing information and assistance are public libraries; schools; business establishments; trade unions, employers' associations, and professional societies; State employment services; and private personnel agencies. A brief description of each follows.

Public Libraries

Public libraries usually have many

books, pamphlets, and magazine articles giving information about different occupations. They also may have several books and current indexes that list the great numbers of publications on occupations; the librarians may be of assistance in finding the best ones on a particular field of work.

Schools

College libraries and placement offices also often have extensive reading materials on occupations. In addition, college career planning and placement counselors usually know of any local occupational information that has been assembled through special surveys made by schools or other community agencies. Professors of special subjects such as art, drama, or music can often give information about occupations related to the subjects they teach.

Business Establishments

Employers and personnel officers usually can supply information about the nature of the work performed by employees in their own industries or businesses, and about the qualifications needed for various jobs, as well as other facts about employment conditions and opportunities. The names of local firms in a particular industry can be found in the classified sections of telephone directories or can be obtained from local chambers of commerce.

Trade Unions, Employers' Associations, and Professional Societies

Frequently, these organizations have local branches; their officials

can supply information relating to the occupations with which they are concerned.

State Employment Services

Counselors in local public employment offices are in a particularly good position to supply information about job opportunities, hiring standards, and wages in their localities. Local offices of State employment services specialize in finding jobs for workers and workers for jobs. State employment services are affiliated with the U.S. Employment Service of the U.S. Department of Labor's Manpower Administration and constitute a Federal-State partnership. Employment services and related forms of assistance to jobseekers are available without charge in every State.

At each of the over 2,400 public employment service offices across the Nation, jobseekers are aided in obtaining employment, and employers are assisted in finding qualified workers.

Four basic services are provided to workers by the public employment service: (1) Job information; (2) employment counseling; (3) referral to job training; and (4) job placement. In addition, a variety of special services are offered.

Job information. The personnel who staff the public employment service offices are familiar with their areas and thus know what kinds of workers are employed in local industry, what jobs are available, what hiring requirements and opportunities for advancement are, and the wages that are paid. Job Information Service (JIS) units in many local offices permit jobseekers to select their own jobs from a computerized listing of job opportunities in the area.

These job listings are updated daily and provide comprehensive information supplied by employers on specific job openings in the area. In addition, the JIS includes a library of general information on occupational trends, industrial developments, and State-Federal government job opportunities, as well as association and union promotional materials. The staff conducts manpower surveys to determine the area's available skills, training needs, and future occupational opportunities. Through the employment service network of offices, information is also available on job opportunities in other areas of the country.

Employment counseling. Employment counseling assists young people who are starting their careers as well as experienced workers who wish or need to change their occupation. The major purposes of employment counseling are to help people understand their actual and potential abilities, interests, and personal traits; to know the nature of occupations; and to make the best use of their capacities and preferences in the light of available job opportunities.

The employment counselor is specially trained and has access to a large store of occupational information.

Testing. Most local offices have testing services available which the counselor may use to assist him in appraising an individual's aptitudes, interests, and clerical and literacy skills.

USES aptitude tests are particularly helpful in relating an applicant's potential abilities to the aptitude requirements of 62 broad occupational groupings and hundreds of specific occupations. A Spanish language version of these

tests and a nonreading edition for individuals with very limited education have also been developed.

Referral to training. Many individuals seek work for which they lack some qualifications. Sometimes the job requires basic education or a specific skill. Besides referring a job-seeker to a job, the public employment service may suggest training for an applicant so that he can qualify for or secure a better job.

Jobs and job requirements change. In today's fast-paced world, important considerations when selecting an occupation are the training required to perform the work and ways that training needs can be met.

Job placement. A primary objective of the public employment service is to place workers in jobs. Regular contact is maintained with local employers to learn about their job openings. Requests are received from employers for many different kinds of workers. As a result, registered applicants have access to a variety of job vacancies with many employers, just as the employer has access to many applicants. This dual function eliminates "hit-or-miss" job hunting.

Special services to veterans. Veterans are legally entitled to priority in all services, with preferential treatment for disabled veterans over other veterans. In addition, the Vietnam Era Veterans Readjustment Assistance Act requires that some specific form of assistance designed

to enhance employment prospects be given to each veteran who applies to the employment service. Each local office has veterans' employment representative who is assigned the responsibility to see that these priority services are provided by all local office staff.

Special services for youth. The employment service maintains a year-round program of services to youth, including counseling, job development, placement, training, and referral to other agencies. Special efforts include: (1) The Summer Employment Program, in which the employment service enlists the cooperation of private and public sectors to help develop as many employment opportunities as possible for disadvantaged youth, to provide valuable summer experience and enable them to return to school in the fall; (2) The ES-School Cooperative Program which provides placement-related services to graduating seniors, school dropouts, and potential dropouts who desire to enter the labor market.

Other special services. Disadvantaged job seekers who have special problems obtaining employment are provided employment services to help overcome barriers. These services may include referral for supportive services such as child care or health examinations to agencies which provide such services, or referral to training which will help develop the jobseeker's employability.

Individuals with mental or physical disabilities which constitute vo-

ational handicaps are given special consideration by the employment service. Middle-aged and older workers are assisted in making realistic job choices and overcoming problems related to getting and holding jobs. Employers are encouraged to hire individuals for their ability to perform the work. Similar attention is given to the employment problems of minority group members and all others facing special difficulties in obtaining suitable employment.

Community manpower services. Jobseekers, employers, schools, civic groups, and public and private agencies concerned with manpower problems are invited to utilize the services of the public employment service office in their community, and to avail themselves of the job information in that office. Local offices are listed in the phone book as agencies of the State government.

Private Personnel Agencies

Private personnel agencies can provide a great deal of information and assistance to jobseekers. These agencies employ counselors to assist clients with career planning and placement. Because they are located in cities and towns throughout the country, private personnel agencies are often an excellent source of information about occupational opportunities in local areas. The private personnel agencies can be found in local telephone directories and generally charge a fee for their services.

II. TOMORROW'S JOBS FOR COLLEGE GRADUATES

Several questions are of major importance to students as they select college courses and subsequently view the variety of occupational choices open to them. Among these questions are: What jobs does my college education prepare me for? What fields have especially promising employment opportunities? How much competition can I expect from other workers? Would additional graduate education greatly enhance my career prospects in this occupation? How do earnings in certain occupations compare with earnings in other occupations requiring similar education? What types of employers provide which kinds of jobs? What are the typical working conditions associated with particular occupations?

Of importance in evaluating information that answers these and related questions is knowledge of the dynamic changes that are continually occurring in our economy—the trends in the work force and in the business, industrial, and occupational development of the Nation. New ways of making goods, new products, and changes in living standards are constantly changing the types of jobs that become available. To throw light on the changing characteristics of occupations and to provide background for understanding the outlook in specific occupations, this chapter focuses on overall patterns of change in the country's industrial and occupational composition. It also discusses

briefly the implications of these changes for employment opportunities for college graduates.

No one can accurately forecast the future. Nevertheless, by using the wealth of information available, extensive economic and statistical analyses, and the best judgment of informed experts, the work future can be described in broad terms. Of course, some aspects of the future can be predicted more accurately than others. For example, the number of 18-year-olds in 1985 can be estimated with a very high degree of accuracy because individuals 5 years old in 1972 are accounted for in our vital statistics, and the death rate of children between 5 and 18 is extremely low and stays about the same from year to year. On the other hand, forecasting employment requirements for newspaper reporters in 1985 is extremely difficult. Employment of these workers can be affected, for example, by the changing patterns in the use of the communications media, such as a shift in preferences for radio or television; changes in the way that newspapers are prepared; and unpredictable economic developments outside of the newspaper industry which may affect the advertising earnings of newspapers.

To project the demand for all workers in the economy, specific assumptions have to be made about general economic trends and broad national policy. The picture of the future employment outlook reflected

in this publication is based on the following fundamental assumptions:

- High levels of employment and manpower utilization will prevail in the mid-1980's.
- No major event such as a long-lasting or widespread energy shortage will alter substantially the rate of economic growth. (Although energy shortages were being experienced in the economy as this publication went to press, no conclusive assessments could be made of the magnitude or duration of the shortages or their long-run effect on employment as factors either stimulating or restricting employment opportunities in specific industries or occupations. Future editions of this publication will incorporate the significant findings of special studies and reports in this area.)
- Economic, social, and educational trends will continue according to recent patterns.
- Scientific and technological advances will continue at about the same rate as in recent years.
- The United States will not be at war, but there will be no substantial cutbacks in the defense budget from its present level.

The following assessment of the 1985 industrial and occupational outlook assumes a total labor force of 107.7 million in 1985, an all-volunteer Armed Forces of 2.0 million, and a civilian labor force of 105.7 million.

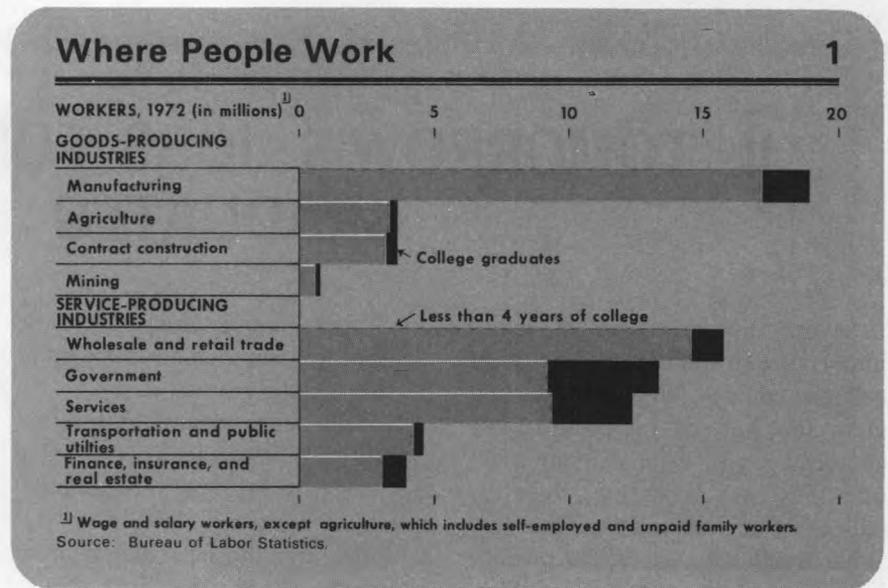
Knowledge of specific industries

is necessary because employers seek a wide variety of skills. For example, many different industries employ engineers, salesmen, and secretaries. Employment patterns have shifted considerably over the years and are expected to continue to do so. These changes greatly affect employment opportunities and occupational choices.

Industry employment and occupational requirements change as a result of many factors. A new machine or a newly automated process may require different occupational skills or may even create an entirely new occupation; a change in product demand may affect the number of workers needed; an invention may all but eliminate an industry or create a new one.

INDUSTRIAL PROFILE

To help understand the Nation's industrial composition, industries may be viewed as either goods producing or service producing. They may further be grouped into nine major divisions according to the goods or services produced. (See chart 1.) Most of the Nation's workers—and most college graduates—are in industries that produce services, in activities such as education, health care, trade, repair and maintenance, government, transportation, banking, and insurance. The production of goods—raising food crops, building, extracting minerals, and manufacturing—has required less than half of the country's work force since the late 1940's. (See chart 2.) In general, job growth through the mid-1980's is expected to continue to be faster in the service-producing industries than in the goods-producing industries. However, among industry divisions within both the goods-producing



ing and service-producing sectors, the growth pattern will continue to vary. (See chart 3.)

Service-Producing Industries

In 1972, 49.7 million workers were on the payrolls of service-producing industries—trade; government; services and miscellaneous industries; transportation and other utilities; and finance, insurance, and real estate—15.9 million more than the number employed in 1960. The major factors underlying the rapid growth of the last decade have been (1) population growth; (2) increasing urbanization with its accompanying need for more city services; and (3) rising incomes and living standards, which have created a demand for improved health and education services. These factors are expected to continue to result in rapid growth of service industries as a group; they are expected to employ 68.7 million by 1985, an increase of 38 percent over the 1972 level.

About 19 percent of all workers in service-producing industries, or 9.3 million, were college graduates

in 1972. The expected rapid employment increase in service-producing industries should include a rapid rise in the number of college-educated workers in these industries.

Trade, the largest division within the service-producing industries, has expanded sharply since 1960. Wholesale and retail outlets have multiplied in large and small cities to satisfy the needs of an increasingly urban society. Employment in trade was 15.7 million in 1972, 38 percent above the 1960 level. About 1.1 million, 7.2 percent of all employed in trade in 1972, were college graduates.

Employment in trade is expected to grow by about 26 percent between 1972 and 1985. Although an ever-increasing volume of merchandise will be distributed as a result of increases in population and consumer expenditures, the rate of increase in total manpower needs will be slowed by laborsaving technology such as the greater use of electronic data processing equipment and automated warehousing equipment, growth in the number of self-service stores, and the growing use of vending machines. Technological ad-

vances and the upgrading of the educational requirements for many jobs should produce rapid growth in the employment of college-educated workers in trade.

Government employment has grown faster than any other industry division, increasing by almost three-fifths from 8.4 million to 13.3 million between 1960 and 1972. Growth has been mostly at the State and local levels, which, combined, increased by more than two-thirds. Employment growth has been greatest in agencies providing education, health, sanitation, welfare, and protective services. Federal Government employment increased 21 percent between 1960 and 1972.

Government is a major area of employment for college-educated workers. More than 30 percent of all Government employees, 4.1 million in 1972, were college graduates.

Government will continue to be a major source of new jobs for college graduates and nongraduates alike through the mid-1980's. By the mid-1980's, employment in government may be as much as 42 percent higher than in 1972. Most of the growth will be in State and

local governments, in which employment needs may rise by 1985 to 16.0 million, about 50 percent higher than the 10.6 million employed in 1972. Federal Government employment is expected to rise slowly, by 150,000, to 2.8 million in 1985—6 percent above the 1972 level of 2.7 million.

Services and miscellaneous industries employment has increased rapidly since 1960 as a result of the growing need for maintenance and repair, advertising, domestic, and health care services. From 1960 to 1972, total employment in this industry division rose by about two-thirds, from 7.4 million to 12.3 million. About 2.9 million, 23.5 percent of those employed in these industries in 1972, were college graduates.

Services and miscellaneous industries will continue to be among the fastest growing industries through the mid-1980's. More than half again as many workers are expected to be employed in this industry division in 1985 as in 1972, and the requirements for college-educated workers should increase substantially. Manpower requirements in

health services are expected to grow rapidly due to population growth and the increasing ability of persons to pay for health care. Business services, including accounting, data processing, and maintenance, also are expected to grow very rapidly.

Transportation and public utility employment of 4.5 million in 1972 was only slightly more than one-tenth higher than in 1960. Different parts of this industry, however, have experienced different growth trends. For example, air travel employment increased rapidly but employment in the railroad industry declined. In 1972, 7.3 percent or 330,000 of these workers were college graduates.

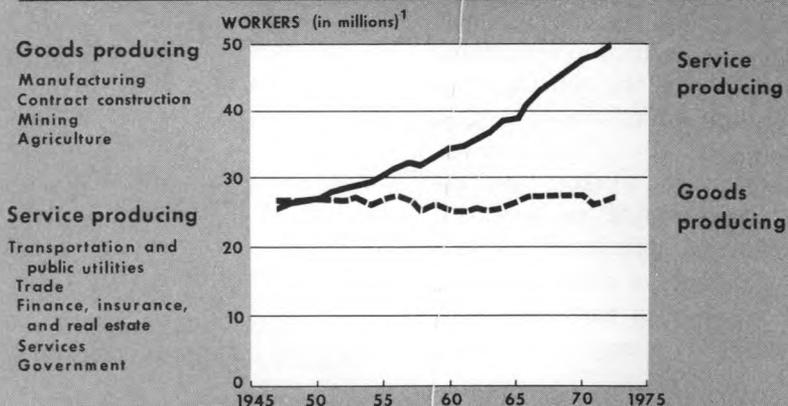
The number of jobs in transportation and public utilities as a whole is expected to increase moderately through 1985 but widely differing employment trends will continue to be experienced among individual industries within the division. Rapid increases in employment are expected in air transportation; a decline is expected to continue in railroad employment; and little or no change is expected in water transportation and electric, gas, and sanitary services. Overall employment in this industry division is expected to increase to 5.2 million in 1985, 15 percent above the 1972 level.

Finance, insurance, and real estate, the smallest of the service-producing industry divisions, grew about 47 percent from 1960 to 1972, to 3.9 million. Employment grew especially rapidly in banks; credit agencies; and security and commodity brokers, dealers, exchanges, and services. In 1972, college graduates constituted 20 percent of the workers in these industries, or 800,000 workers.

Job growth in finance, insurance, and real estate will keep in step with

Industries Providing Services Offer More Jobs Than Those Providing Goods

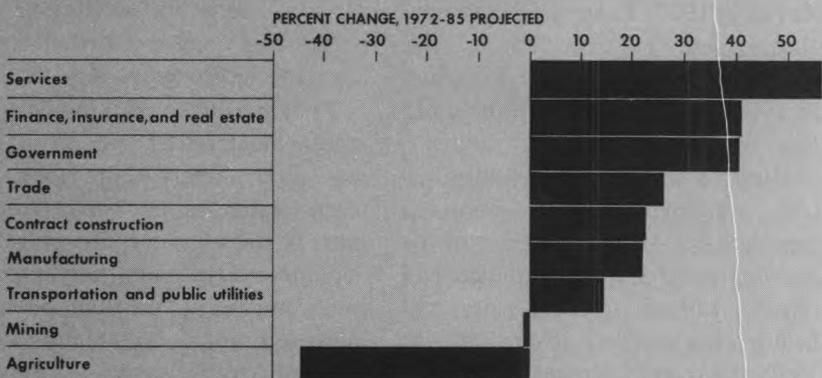
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¹ Wage and salary workers, except agriculture, which include self-employed and unpaid family workers.

Source: Bureau of Labor Statistics.

Through the Mid-1980's Employment Growth Will Vary Widely by Industry 3



Source: Bureau of Labor Statistics.

the overall increase in nonfarm employment through the mid-1980's. Finance, insurance, and real estate employment is expected to expand to 5.6 million by 1985, 42 percent above the 1972 level.

Goods-Producing Industries

Employment in the goods-producing industries of agriculture, mining, construction, and manufacturing—26.5 million in 1972—has increased slowly in recent years. Significant gains in productivity resulting from automation and other technological developments, as well as the growing skills and educational attainment of the work force, have permitted large increases in output without corresponding increases in employment. In 1972, 7.8 percent of the workers employed in these industries, 2.1 million persons, were college graduates. Employment in goods-producing industries is expected to increase to about 30 million in 1985, 13 percent above the 1972 level. However, widely different patterns of employment change have occurred and will continue to

occur among the industry divisions in the goods-producing sector.

Agriculture, which until the late 1800's employed more than half of all workers in the economy, employed only 4 percent, or 3.5 million workers, in 1972; 3.5 percent of the agricultural workers, or 120,000, were college graduates. An increase in the average size of farms, rapid mechanization, and improved fertilizers, feeds, and pesticides have created large increases in output at the same time that employment has fallen sharply.

Agriculture is facing a continuing decline in manpower needs. Factors which produced past declines will continue to influence agricultural employment and the outlook is for a 1985 farm work force 45 percent smaller than in 1972. However, college-educated workers are expected to constitute an increasing proportion of agricultural employment as a result of continuing technological advances and increasingly sophisticated management techniques.

Mining, employing 607,000 workers in 1972, declined by 15 percent from 1960, primarily because of

laborsaving technological changes. In 1972, 75,000 college graduates worked in the mining industry—12.2 percent of all mining workers.

The current trend is likely to continue and mining is the only non-agricultural industry division that is not expected to increase between 1972 and 1985.

Contract construction employment increased more than one-fifth from 1960 to 1972. In 1972, 3.5 million persons were employed; 7.7 percent of them—270,000 workers—were college graduates. The Nation's growing need for homes, offices, highways, bridges, dams, and other structures caused this employment increase. Between 1972 and 1985, contract construction employment is expected to grow by more than one-fifth to 4.3 million.

Manufacturing, the largest industry within the goods-producing sector, with 18.9 million workers in 1972, increased by 13 percent between 1960 and 1972. Of all those employed in manufacturing in 1972, 1.6 million workers, or 11.8 percent, were college graduates. Development of new products for industrial and consumer markets and the rapid growth of defense-space expenditures spurred manufacturing's post-World-War-II growth.

Manufacturing employment is expected to increase 23 percent through the mid-1980's and reach 23.2 million in 1985. The rise in durable goods manufacturing is projected to be slightly faster and in nondurable goods somewhat slower than the total. However, the rate of growth will vary among the individual manufacturing industries.

OCCUPATIONAL PROFILE

As American industries continue to grow larger, more complex, and more mechanized, basic changes will

take place in the Nation's occupational structure. Occupations will tend to become more complex and specialized. Thus, an imposing and confusing number of occupational choices is provided to persons who are planning their careers. An individual, in examining the vast number of choices, should first look at broad groupings of jobs that have similar characteristics, such as entrance requirements and educational attainment needed.

Among the most significant changes in the Nation's occupational structure over the last decade has been the continuing shift toward white-collar jobs—jobs in which most college-educated workers are employed. In 1972 white-collar workers—professional, managerial, clerical, and sales—outnumbered blue-collar workers—craftsmen, operatives, and laborers—by more than 10 million. (See chart 4.)

Through the mid-1980's, we can expect a continuation of the rapid growth of white-collar occupations, a slower than average growth of blue-collar occupations, a faster than average growth among service workers, and a further decline

of farm workers. (See chart 5.) Total employment is expected to increase 24 percent between 1972 and 1985. In comparison, an increase of 38 percent is expected for white-collar jobs, but only 14 percent for blue-collar occupations. By 1985, white-collar jobs will account for more than one-half of all employed workers compared with 48 percent in 1972. The rapid growth expected for white-collar workers and service workers reflects continuous expansion of the service-producing industries which employ a relatively large proportion of these workers. The growing demand for workers to conduct research and development, to provide education and health services, and to perform the increasingly complex management duties in all types of enterprises also will be significant factors in the growth of white-collar jobs. The slower than average growth of blue-collar and farm workers reflects the expanding use of laborsaving equipment in the Nation's industries and the relatively slow growth of the goods-producing industries that employ large proportions of blue-collar workers.

The following section describes in greater detail the changes that are expected to occur among the broad occupational groups through the mid-1980's.

White-Collar Workers

White-collar workers, who numbered 39.1 million in 1972, included about 14 out of every 15 employed college graduates. More than one-quarter of all white-collar jobs, or 10.6 million, were filled by college graduates in 1972. By the mid-1980's, college graduates are expected to hold about one-third, or 18.1 million, of the 54.1 million white-collar jobs.

Although the number of college graduates in white-collar jobs is expected to grow by about 70 percent, their employment in some white-collar occupations will increase more than in others. The outlook for the major white-collar occupational groups of professional and technical workers, managers and administrators, salesworkers, and clerical workers is as follows:

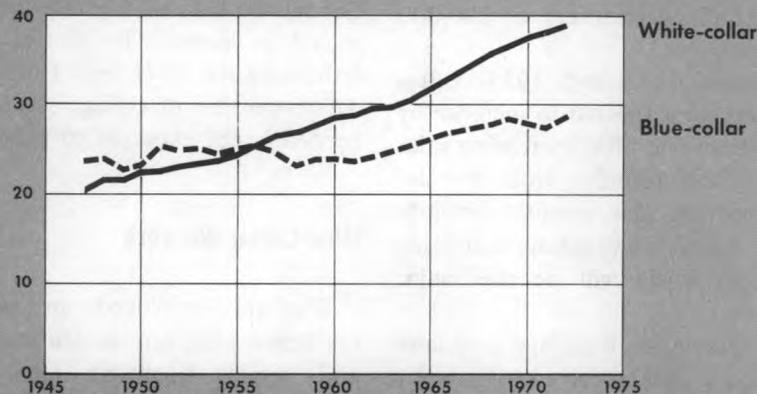
Professional and technical workers were the third largest occupational group in 1972, but contained the largest proportion of college graduates. (See chart 6.) Among the 11.5 million professional and technical workers were nearly 7 million college graduates, who made up over 60 percent of the total. They included such highly trained personnel as teachers, engineers, dentists, accountants, and clergymen.

Professional and technical occupations will be the fastest growing from 1972 to 1985. (See chart 7.) Workers in this group will be in great demand as the Nation puts greater efforts into socioeconomic progress, urban renewal, transportation, harnessing the resources of

Employment Has Shifted Toward White-Collar Occupations

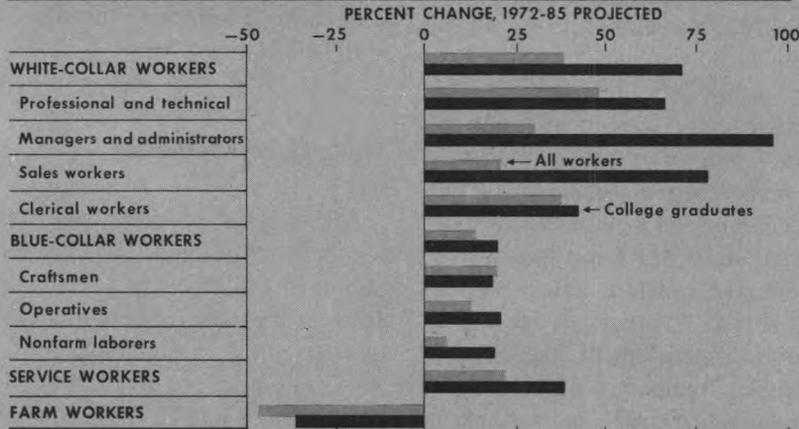
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WORKERS (in millions)



Source: Bureau of Labor Statistics.

Faster Than Average Employment Growth is Expected for College Graduates 5



Source: Bureau of Labor Statistics.

the ocean, and enhancing the quality of the environment. Scientific and technical knowledge will continue to grow and raise the demand for workers in scientific and technical specialties. The late 1970's and early 1980's will see a sustained emphasis on the social sciences and medical services.

By 1985, 17 million professional, technical, and kindred workers may be required, nearly 50 percent more than were employed in 1972. In particular, requirements for college graduates in professional and technical jobs are expected to increase by nearly two-thirds, reaching 11.6 million.

Managers and administrators totaled 8.0 million in 1972; about one-quarter of them, or 2.0 million, were college graduates. As in the past, requirements for salaried managers are likely to continue to increase rapidly because of the growing dependence of business organizations and government agencies on management specialists. On the other hand, the number of self-employed managers is expected to continue to decline as the trend toward larger businesses continues to re-

strict growth of the total number of firms and as supermarkets continue to replace small grocery stores. Managers and administrators as a group will increase by about 30 percent between 1972 and 1985. Requirements for college graduates in managerial and administrative jobs, primarily salaried positions, are expected to nearly double over the period.

Salesworkers, accounting for 5.4 million workers in 1972, are found primarily in retail stores, wholesale firms, insurance companies, and real estate agencies, and in firms offering goods door to door. In 1972, college graduates constituted about 15 percent of all salesworkers, or 780,000 workers.

Between 1972 and 1985, salesworkers are expected to increase by more than one-fifth. Increasing sales of products resulting from population growth, new product development, business expansion, and rising business levels will be the major reasons.

Employment of college graduates in sales jobs is expected to grow by nearly four-fifths by the mid-1980's. Over 21 percent, or 1.4 million of the

6.6 million salesworkers expected to be employed in 1985, will be college graduates. The rising number of college graduates in sales positions reflects to some extent the trend for employers to hire persons with the highest educational qualifications. An increase in the proportion of salesworkers who are college graduates, however, also reflects the changing nature of sales occupations. Increasingly, sales personnel are required to have technical knowledge of the product or service being sold, especially in the manufacturing and computer fields.

Clerical workers, numbering 14.2 million in 1972, include workers who operate computers and office machines, keep records, take dictation, and type. Clerical workers were the largest occupational group in 1972, but less than 6 percent of them, or 810,000 workers, were college graduates. Many new clerical positions are expected to open up as industries employing large numbers of clerical workers continue to expand. The trend in retail stores toward transferring to clerical workers functions that were performed by salespersons also will tend to increase the need for clerical workers. The demand also will be strong for those qualified to handle jobs created by electronic data processing operations. The requirements for clerical workers as a group are expected to increase by almost two-fifths between 1972 and 1985, but the proportion of college graduates needed is not expected to grow.

Blue-Collar Workers

Workers employed in skilled craftsman jobs, semiskilled machine and vehicle operative jobs, and laborer jobs totaled 28.6 million in 1972—35 percent of the employed

Farm Workers

Farm workers—including farmers, farm managers, laborers, and foremen—numbered 3.1 million in 1972. Employment requirements for farm workers are expected to decline to 1.6 million in 1985 in response to continued improvements in farm technology. Nearly 3 percent, or almost 80,000 farm workers, were college graduates in 1972, and although this proportion is expected to increase slightly by 1985, employment of college graduates in farm jobs is expected to decline to about 50,000.

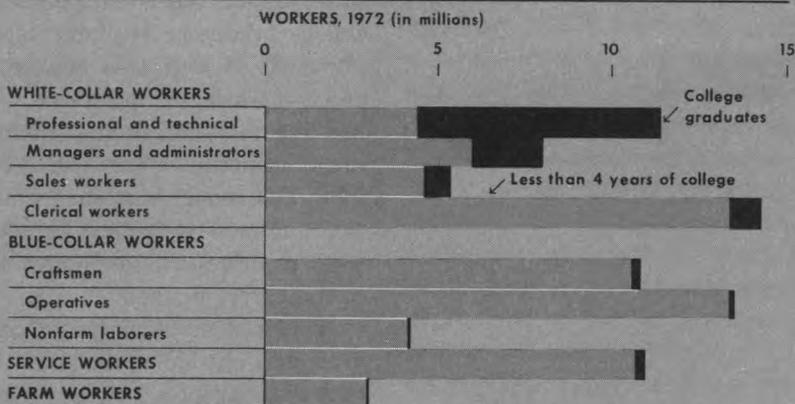
COLLEGE GRADUATES: DEMAND AND SUPPLY, 1972-85

Nearly one-quarter of all job openings between 1972 and 1985 are expected to require persons who have completed 4 years or more of college. College graduates will be needed for almost one-third of all white-collar job openings—primarily in the fastest growing groups—professional and technical workers, and managers and administrators. Nearly 3 out of 4 openings in professional and technical occupations, and more than half of the job openings in managerial and administrative occupations, will require workers who have earned their college degrees. (See chart 7.) The increasing requirement for college graduates reflects a continuing trend. The proportion of all employed persons who were college graduates grew from 10 percent in 1959 to 14 percent in 1973; the expectation is that this proportion will keep increasing, reaching almost 19 percent by the mid-1980's.

Job openings for college-educated workers stem from three sources:

College Graduates Work Primarily in Professional and Technical Jobs

6



Source: Bureau of Labor Statistics.

laborer force. The 420,000 college graduates employed in those jobs, however, constituted less than 2 percent of all blue-collar workers.

Blue-collar employment is expected to increase slowly through the mid-1980's, representing a declining share of the labor force. By 1985, 32 percent of all employed, or 32.7 million workers, will be employed in blue-collar jobs. Industrial growth and increasing business activity are the major factors expected to spur the growth of blue-collar occupations. Technological developments enabling greater automation of production, however, will repress employment of blue-collar workers while raising their productivity. Although more than 500,000 college graduates are expected to occupy blue-collar jobs by the mid-1980's, they will still constitute less than 2 percent of all blue-collar workers.

Service Workers

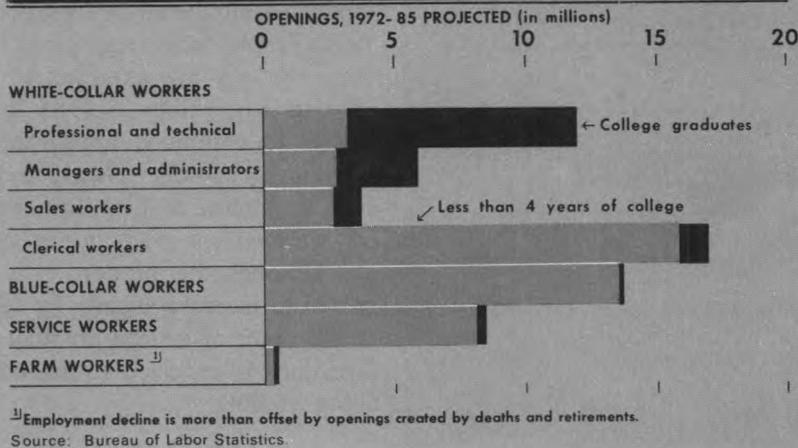
Service workers, including men and women who provide protective services, assist professional nurses

in hospitals, give haircuts and beauty treatments, serve food, and clean and care for homes, totaled 11.0 million in 1972. This diverse group will increase 22 percent between 1972 and 1985. Some of the main factors that are expected to increase requirements for service workers to 13.3 million by 1985 are the rising demand for hospital and other medical care; the greater need for protective services as urbanization continues and cities become more crowded; and the more frequent use of restaurants, beauty parlors, and other services as income levels rise and as an increasing number of housewives take jobs outside the home.

In 1972, more than 2 percent of all service workers, or 240,000, were college graduates. This proportion is expected to increase slightly by 1985, when 330,000 college graduates are expected to be required. Expected rapid growth of college graduate employment in service jobs will stem from increasingly sophisticated techniques used in law enforcement and other services.

Most Job Openings for College Graduates Through the Mid-1980's Will Be in White-Collar Jobs

7



growth in employment in occupations currently filled by college graduates; the need to replace graduates who die, retire, or leave the labor force for other reasons; and rising job entry requirements or the trend toward hiring college graduates for jobs once performed by those with less education.

Over the period from 1972 through the mid-1980's, 14.5 million college graduates will be needed to meet requirements from these three sources. Growth of occupations currently filled by college graduates is expected to account for 4.7 million openings; 7 out of 10 of these openings will be in professional and technical occupations. Another 6.8 million openings will result from the need to replace those who die, retire, or leave the labor force. Finally, 3.0 million openings will result from upgrading the education prerequisites for jobs not previously requiring a college degree for entry.

"Educational upgrading," or rising entry requirements, results from a number of factors—some related to the changing nature or content of existing jobs; some related to the

increasing availability or supply of college graduates; and some related to noneconomic factors. College graduates will be demanded in some jobs traditionally held by less educated workers due to the increasingly complex skills required for those jobs. As computers and other technical advances continue to spread through an ever-broadening range of jobs, college-educated workers will be required to use these capabilities efficiently. In other cases, an understanding of complex legal and regulatory constraints imposed on business and industry is becoming increasingly essential for many jobs.

Educational upgrading will occur in a wide range of jobs, primarily those in managerial and sales work. For example, the increasing reliance of business and government on salaried management specialists and the historical decline in the number of self-employed managers help explain the anticipated growth of college graduates in managerial occupations. Sales personnel are increasingly required to have technical knowledge in order to better demonstrate and adequately explain the product or service they are selling.

Also, employers may have preferred to hire college graduates for various jobs but could not compete for them in the past.

Rising entry requirements may simply reflect the greater number of college graduates available for employment as well as a general tendency to hire the person who has the highest educational qualifications, especially for white-collar jobs. This would happen if substantial numbers of college graduates were unsuccessful in finding a job in the career of their choice.

Increased employment of college graduates outside of the professions may also reflect a lack of ability or motivation for professional work on the part of some graduates. It may also reflect sexual and racial discrimination as well as a host of other factors.

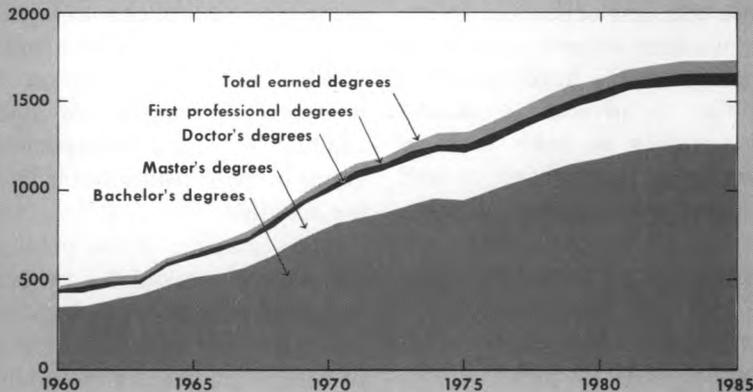
Record numbers of college degrees will continue to be awarded each year through the mid-1980's. (See chart 8.) Nearly 1.2 million bachelor's, master's, doctor's, and first professional degrees were awarded during the 1971-72 academic year—more than two and one-half times the number awarded during the 1958-59 academic year. By 1985 more than 1.7 million college degrees are expected to be awarded annually. Twice as many college degrees will be earned from 1972 through 1985 as were earned from 1958 through 1972. Of the 20.1 million degrees expected to be earned between 1972 and 1985, seven out of ten will be bachelor's degrees.

Although these expected college graduates represent potential new entrants to the labor force, not all can be considered part of the effective new supply of college-educated workers. For example, most master's and doctor's degree recipients are employed before receiving their

The Number of Degrees Awarded is Expected to Continue to Increase Through the Mid-1980's

8

EARNED DEGREES (in thousands)



Source: Office of Education.

advanced degrees and consequently are already considered part of the supply of college graduates in the labor force. Many other degree recipients, especially those holding bachelor's degrees, delay entry into the civilian labor force to continue their education, enter the Armed Forces, or become full-time housewives.

The new supply of college graduates expected to enter the labor force from 1972 to 1985 will total 15.3 million. (See chart 9.) On the basis of past patterns of entry into the labor force by college graduates, 13.2 million of the recipients of college degrees between 1972 and 1985 are expected to enter the civilian labor force during that period. Included are 11.2 million bachelor's degree recipients, 1.2 million master's degree recipients, nearly 20,000 doctor's degree recipients, and 750,000 holders of first professional degrees such as law or medical degrees. In addition, 2.1 million college graduates are expected to enter or re-enter the civilian labor force from sources other than the Nation's colleges and universities. They include

housewives, persons separating from the Armed Forces, persons returning to the United States after living in a foreign country, immigrants, and others.

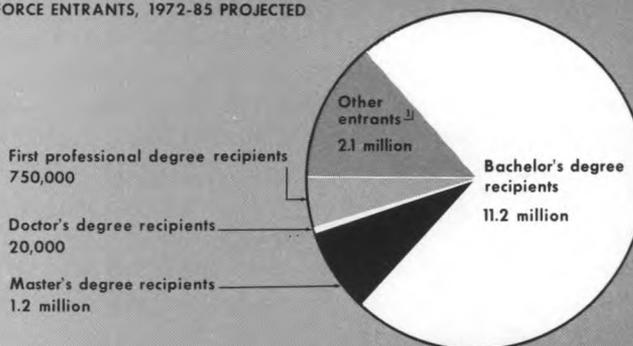
Thus, as a result of these trends in the demand for and supply of college graduates, the number of persons with college degrees entering the labor force over the 1972-1985 period is expected to be about 800,000 above the number of projected job openings.

A greater oversupply of college graduates is expected over the 1980-85 period than over the 1972-80 period. The projected "gap" is roughly 100,000 for 1972-1980, or 12,500 a year on the average, and 700,000 for 1980-85, or 140,000 a year. The widening of the gap arises from the expected slow-down in the rate of growth of the economy in the later period and not from an accelerated increase in the number of degree recipients. In fact, the rise in the number of degree recipients will slow over 1980-85. The average number of degrees granted annually over 1972-80 is expected to total 1,440,000, almost 70 percent or 585,000 higher than the previous 10 years' average of 856,000 annually. But over the 1980-85 period, degrees granted will average 1,718,000, only 277,000 more or 19 percent higher than over 1972-1980. However, it is expected that job openings over 1980-85 will be rising at an even slower rate. Annual job openings will increase an average of only 4 percent, a rise of barely 50,000 over the average of 1.1 million job openings annually over the 1972-80 period.

Over 15 Million College Graduates are Expected to Enter the Civilian Labor Force Between 1972 and 1985

9

LABOR FORCE ENTRANTS, 1972-85 PROJECTED



⌚ Includes reenrants and persons separating from military services.
Source: Bureau of Labor Statistics.

A statistical "oversupply" of college graduates does not imply that college graduates will experience significant levels of unemployment. The unemployment rate of college graduates has always been lower than that of workers with less education. (See chart 10.) Problems for college graduates will center on underemployment and job dissatisfaction, which are likely to result in increasing movement among occupations rather than unemployment. Many individuals may have to take jobs for which a college degree has not been a requirement in the past—perhaps jobs in which their training might not be fully utilized. Sales,

clerical, and service jobs will be likely to absorb most of the surplus graduates.

The availability of more college graduates will have an adverse effect on those with less education. In the future, workers without college degrees will probably have fewer opportunities to advance to professional positions in fields such as engineering and accounting as well as to higher level managerial, sales, and service jobs. Thus, while college graduates may face competition for jobs, those without a college education will face even greater competition for the better jobs.

On the other hand, in some occu-

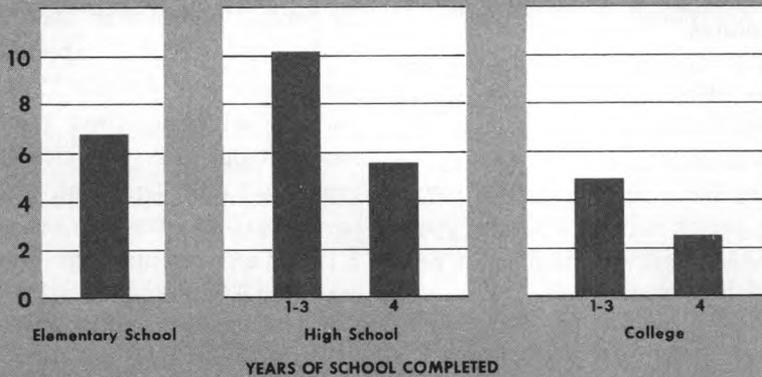
pations, graduates of four-year colleges are likely to face unprecedented competition from community and junior college graduates. Community colleges and other post-secondary institutions have shown that they can train students for many occupations in 2 years or even less, and the number of students completing career education programs in these institutions is increasing rapidly.

The remainder of this publication discusses the outlook for various occupations requiring a college degree for entry. Although an oversupply of college graduates is generally expected, the outlook for individual occupations varies a great deal. For example, a shortage of graduates with the education required to become chemists, engineers, and medical doctors is expected, if past trends continue, as is a surplus of graduates in teaching and the biological sciences. This highlights the importance of careful career planning while in high school and college. By selecting courses of study in light of what the future world of work will be like, students can graduate from college with the most marketable types of education and training. The *Occupational Outlook for College Graduates* and career guidance counselors can provide valuable assistance in this regard.

Unemployment Rates are Lowest for College-Educated Workers

10

MARCH 1972 UNEMPLOYMENT RATE (percent)



Source: Bureau of Labor Statistics.

III. OCCUPATIONS

OFFICE OCCUPATIONS

Office workers perform a wide range of tasks that are needed to keep business and other organizations running on a day-to-day basis. Clerical workers maintain files, type, and operate office machines. Professional and technical employees give legal advice, prepare and analyze financial reports, design computer systems, and arrange bank loans.

Opportunities in office work exist for people with widely different educational backgrounds. Some jobs can be entered with only a high school education, but many others require at least a college degree.

Many clerical employees work with things and often do detailed, repetitive tasks. Most professional office workers, on the other hand, work with ideas; they apply their skills to solving problems and devising ways to provide better services to those who depend on them. Besides the technical skills required to do their jobs, office workers need judgment and the ability to communicate their ideas to others.

This section describes office work for college graduates in administrative and related occupations, computer and related occupations, and insurance occupations.

ADMINISTRATIVE AND RELATED OCCUPATIONS

Most administrative workers are office employees who run, or help

run, businesses and other organizations. Some are managers, who supervise, plan operations, and make company policy. Others provide assistance to management, such as personnel workers who recruit and hire staff members and handle employee problems. Much administrative work is highly specialized and most workers gain experience and skill through on-the-job training. The success or failure of an organization depends heavily on the way administrative workers do their jobs.

Nearly all administrative jobs require a college degree, although employers vary in the specific area of study they prefer. Some seek business administration or liberal arts graduates; others want employees who have a background in a technical area such as engineering or science.

Many administrative workers solve problems and make decisions, using numbers and technical data. In addition, these workers must be tactful and able to get along with others. They must be able to handle the uneven flow of work in offices.

This section describes a number of administrative occupations, including city managers, accountants, credit officials, and personnel workers.

ACCOUNTANTS

(D.O.T. 160.188)

Nature of the Work

Managers must have up-to-date financial information to make important decisions. Accountants prepare and analyze financial reports that furnish this kind of information.

Three major accounting fields are public, management, and government accounting. Public accountants are independent practitioners or employees of accounting firms. Management accountants, often called industrial or private accountants, handle the financial records of their firms. Government accountants examine the records of government agencies and audit private businesses and individuals whose dealings are subject to government regulations.

Accountants often specialize in areas such as auditing, taxes, or budgeting and control. Many public accountants specialize in auditing (reviewing a client's financial records and reports to judge their reliability). Others advise clients on tax matters and other financial and accounting problems. Management accountants provide the financial information that executives need to make intelligent business decisions. They may specialize in taxes, budgeting, investments, or internal auditing (examining and appraising their firms' financial systems and management control procedures). Many accountants in the Federal Government work as Internal Revenue agents, investigators, and bank examiners; other government accountants have regular accounting positions.



Accountant discusses client's financial records.

Places of Employment

More than 700,000 people worked as accountants in 1972; about 20 percent were Certified Public Accountants (CPA's). About 3 percent of the CPA's and 22 percent of all accountants are women.

More than 60 percent of all accountants do management accounting work. An additional 20 percent are engaged in public accounting as proprietors, partners, or employees of independent accounting firms. Other accountants work for Federal, State and local government agencies, and a small number teach in colleges and universities.

Accountants are found wherever business, industrial, or government organizations are located. Most, however, work in large urban areas where many public accounting firms and central offices of large businesses are concentrated.

Training, Other Qualifications, and Advancement

Training in accounting is avail-

able at colleges and universities, accounting and business schools, and correspondence schools. Although many graduates of business and correspondence schools are successful in small accounting firms, most large public accounting and business firms require applicants to have at least a bachelor's degree in accounting or a closely related field. Many employers prefer those with the master's degree in accounting. For beginning accounting positions, the Federal Government requires 4 years of college training (including 24 semester hours in accounting or related subjects) or an equivalent combination of education and experience. For teaching positions, most colleges and universities require the master's degree or the doctorate with the Certified Public Accountancy Certificate.

Previous work experience in accounting can help an applicant get a job. Many colleges offer students an opportunity to gain experience through internship programs conducted by public accounting or business firms.

Anyone working as a "certified public accountant" must hold a certificate issued by the State board of accountancy. All states use the CPA examination, administered by the American Institute of Certified Public Accountants, to establish certification. Although only half the States require CPA candidates to be college graduates, most successful candidates have college degrees. Nearly all States require applicants to have at least 2 years of public accounting experience for a CPA certificate.

Requirements vary, but more than half the States restrict the title "public accountant" to those who are licensed or registered. Information on requirements may be obtained directly from individual State boards of accountancy or from the National Society of Public Accountants.

People planning a career in accounting should have an aptitude for mathematics. Neatness and accuracy also are necessary. Employers seek applicants who handle responsibility and work with little supervision.

Accountants who want to get to the top in their profession usually must continue their study of accounting even though they already have college degrees or CPA certificates. They may take part in seminars sponsored by various professional associations or take courses offered by their employers. An increasing number of accountants study computer operation and programming to adapt accounting procedures to new data processing methods. Although capable accountants may advance rapidly, those having inadequate academic preparation are likely to be assigned routine jobs and may find promotions difficult to obtain.

Junior public accountants usually start by assisting with auditing work for several clients. They may ad-

vance to intermediate positions with more responsibility in 1 or 2 years and to senior positions within another few years. In larger firms, those who deal successfully with top industry executives often become supervisors, managers, or partners, or transfer to executive positions in private firms. Some open their own public accounting offices.

Beginning management accountants often start as ledger accountants, junior internal auditors, or as trainees for technical accounting positions. They may advance to jobs such as chief plant accountant, chief cost accountant, budget director, senior internal auditor, or manager of internal auditing. Some become controllers, treasurers, financial vice-presidents, or corporation presidents. In the Federal Government, beginners are hired as trainees and usually promoted in a year or so. In college and university teaching, those having minimum training and experience may receive the rank of instructor without tenure; advancement and permanent faculty status depend upon further education and teaching experience.

Employment Outlook

Employment of accountants is expected to increase rapidly through the mid-1980's as businesses and government agencies continue to expand in size and complexity. Thousands of additional openings will occur as employees die, retire, or leave their jobs to seek other work.

Greater use of accounting information in business management, changing tax systems, and growth of large corporations that must provide financial reports to stockholders, all point to excellent opportunities for accountants. Because of the growing complexity of business accounting requirements, accountants with college degrees will be in

stronger demand than those who lack this training. In addition, the trend toward specialization will create opportunities for people trained in a specific phase of accounting.

As data processing systems continue to replace manual preparation of accounting records and statements, the need for some lower level accountants may be reduced or eliminated. On the other hand, many highly-trained accountants will be required to prepare, administer, and analyze the information made available by these systems.

Earnings and Working Conditions

Starting salaries of beginning accountants in private industry were \$9,100 a year in 1972, according to a Bureau of Labor Statistics survey in urban areas. Earnings of experienced accountants ranged between \$11,900 and \$17,400, depending on their level of responsibility and the complexity of the accounting system. In general, experienced accountants earn about twice as much as average earnings of all nonsupervisory workers in private industry, except farming. Chief accountants who direct the accounting program of a company or one of its establishments earned between \$15,300 and \$26,500, depending upon the scope of their authority and size of professional staff.

According to the same survey, beginning auditors averaged \$9,600 a year, while experienced auditors' earnings ranged between \$12,900 and \$15,900.

Salaries generally are somewhat higher for accountants holding a graduate degree or a CPA certificate. Earnings also are higher for those who are required to travel a great deal.

In the Federal Civil Service the entrance salary for junior accountants

and auditors was about \$7,700 in early 1973. Candidates who had superior academic records received a starting salary of about \$9,500. Some auditors began at about \$10,300. Experienced accountants in the Federal Government averaged about \$20,000 a year. Those with administrative responsibilities earned more.

Accountants often work very long hours under heavy pressure during the tax season and some travel extensively. The majority, however, remain in one office and work between 35 and 40 hours a week, under the same general conditions as fellow office workers.

Sources of Additional Information

Information about CPA's and aptitude tests given in many high schools, colleges, and public accounting firms may be obtained from:

American Institute of Certified Public Accountants, 666 Fifth Ave., New York, N.Y. 10019.

Further information on specialized fields of accounting is available from:

National Association of Accountants, 919 Third Ave., New York, N.Y. 10022.

National Society of Public Accountants, 1717 Pennsylvania Ave., NW., Washington, D.C. 20006.

ADVERTISING WORKERS

(D.O.T. 050.088, 132.088, 141.081 and .168, 162.158, and 164.068 through .168)

Nature of the Work

Through advertisements, businesses try to reach potential customers and persuade them to buy their products or services. Advertising workers are employed in many industries to plan and prepare ads. To get advertisements before the public, copywriters write texts; artists prepare illustrations; administrative and technical workers reproduce "ads"; and salesmen sell advertising space and time for publications, radio, and television. In some small advertising organizations, one person handles all these tasks; large organizations, however, may employ research, copywriting, and other specialists. The following specialties commonly are found in advertising work.

Advertising managers direct a firm's advertising program. They decide policy questions such as the type of advertising, the advertising budget, and the agency to employ. The advertising manager and agency work together to plan the program and carry it through. They also may supervise the preparation of special sales brochures, display cards, and other promotional materials. Advertising managers of newspapers, radio stations, or other advertising media are responsible for selling advertising time or space. Their work is similar to that of sales managers in other businesses.

Account executives work in advertising agencies to handle relations between the agency and its clients. An account executive studies the client's sales and advertising problems, develops a plan to meet the client's needs, and seeks his approval

of the proposed program. Account executives must be able to sell ideas and maintain good relations with clients. They must also know how to write copy and use artwork, even though copywriters and artists usually carry out their ideas and suggestions. Some advertising agencies have account supervisors who oversee the work of the account executives. In others, account executives are responsible directly to agency heads.

Research directors and their assistants assemble and analyze information for advertising programs. They study possible uses of a product, its advantages and disadvantages compared to competing products, and ways of reaching potential buyers. These workers may survey buying habits and motives of customers, or try out sample advertisements to find the best selling theme or media. (See the statement on Marketing Research Workers for more information on this occupation.)

Advertising copywriters create the headlines, slogans, and text that attract buyers. They collect information about products and potential customers. Copywriters use a knowledge of psychology and writing to prepare copy especially suited for the particular readers or listeners sought as buyers and for the advertising medium used. They may specialize in a type of copy that appeals to certain groups—housewives, businessmen, scientists, engineers—or that deals with a class of items such as packaged goods or industrial products. In advertising agencies, copywriters work closely with account executives, although they may also be under the supervision of a copy chief.

Artists and layout workers plan and create visual effects in advertisements. (See the statements on Commercial Artists and Photographers elsewhere in the *Handbook* for



more information on these occupations.)

Advertisers and advertising agencies employ *media directors* (or *space buyers* and *time buyers*) to negotiate contracts for advertising space or time. They determine where and when advertising should be carried to reach the largest group of prospective buyers at the least cost. They must know the advertising costs in different media and the characteristics of the audience reached in various parts of the country by specific publications, broadcasting stations, and other media.

Production managers and their assistants arrange to have the copy and art work converted into print. They deal with printing, engraving, filming, recording, and other firms involved in the reproduction of advertisements. The production manager needs a thorough knowledge of printing, photography, paper and inks, and related technical materials and processes.

Places of Employment

In 1972, about 150,000 people worked in jobs that require considerable knowledge of advertising. More than one-third were employed in advertising agencies, largely con-

centrated in New York City and Chicago.

These workers also are employed by organizations having products or services to sell, like manufacturing companies and stores; by advertising media, such as newspapers and magazines; and by firms providing services to advertisers, including printers, engravers, art studios, and product and package designers.

Training, Other Qualifications, and Advancement

Most employers prefer college graduates having liberal arts training or majors in advertising, marketing, journalism, or business administration. However, no typical educational background is equated with success in advertising. Experience in copywriting, work on school publications, or summer jobs with marketing research services are helpful.

Some large advertising organizations recruit outstanding college graduates and train them through programs that cover all aspects of advertising work. Some beginners start as assistants in research or production work or as space or time buyers. A few begin as junior copywriters.

Most advertising jobs require a flair for language, both spoken and written. Because every assignment requires specialized handling, an ability for problem-solving also is important. Advertising workers should be interested in people and things; they also need tact to help them sell their ideas to superiors, advertisers, and the public. They must also be able to accept criticism and work as part of a team.

Copywriters and account executives may advance to managerial jobs or more responsible work in their own specialties, if they demonstrate ability in dealing with clients.

Some top-flight copywriters and account executives establish their own agencies.

Employment Outlook

Employment of advertising workers is expected to increase moderately through the mid-1980's, as the volume of consumer goods and competition among manufacturers increase. Although opportunities should be favorable for highly qualified applicants, those seeking entry jobs will face stiff competition. Most openings will result from the need to replace those who retire, die, or leave the occupation for other reasons.

Earnings and Working Conditions

According to the limited information available, annual starting salaries for beginning advertising workers with bachelor's degrees ranged from \$6,500 to \$10,000 in 1972 and from \$11,000 to \$13,000 for those with master's degrees. The higher starting salaries usually were paid by very large firms to outstanding college graduates.

Salaries of experienced advertising workers employed by advertising agencies varied by size of firm and type of job. For example, account executives' salaries averaged \$18,000 to \$22,000 a year; media directors, \$10,000 to \$16,000, according to limited information.

Advertising workers frequently work under great pressure. Working hours sometimes are irregular because of deadlines and last minute changes. People in creative jobs often work evenings and weekends to finish important assignments.

Advertising may be a satisfying career for those who enjoy variety, excitement, creative challenges, and competition. Advertising workers experience the satisfaction of having

their work in print, on television, or on radio, even though they remain unknown to the public at large.

Sources of Additional Information

Information on advertising agencies and the careers they offer may be obtained from:

American Association of Advertising Agencies, 200 Park Ave., New York, N.Y. 10017.

Association of Industrial Advertisers, 41 East 42nd Street, New York, N.Y. 10017.

A list of schools providing training in advertising may be obtained from:

American Advertising Federation, 1225 Connecticut Ave., NW., Washington, D.C. 20036.

BANK OFFICERS

(D.O.T. 186.118, .138, .168, and .288; 161.118, 189.118 and .168)

Nature of the Work

Practically every bank has a president who directs operations; one or more vice presidents who act as general managers or have charge of bank departments such as trust, or credit; and a comptroller or cashier who, unlike cashiers in stores and other businesses, is an executive officer generally responsible for all bank property. Large banks also may have treasurers and other senior officers, as well as junior officers, to supervise the various sections within different departments. Banks employed almost 220,000 officers in 1972; women were about one-sixth of the total.

A bank officer makes decisions within a framework of policy set by the board of directors and existing

Training, Other Qualifications, and Advancement



Branch bank manager helps new customers open checking account.

Bank officer positions are filled by management trainees or by promoting outstanding bank clerks. College graduation usually is required for management trainees. A business administration major in finance or a liberal arts curriculum including accounting, economics, commercial law, political science, and statistics serve as excellent preparation for officer trainee positions. Valuable experience may be gained through summer employment programs.

Many banks have well-organized officer-training programs usually ranging from 6 months to 1 year. Trainees may start as credit or investment analysts or rotate among bank departments to get the "feel" of banking; bank officials then can determine the position for which each employee is best suited.

Although persons planning to become bank officers should like to work independently and analyze detailed information, they need tact and good judgment in order to counsel customers.

Advancement to officer may come slowly in small banks where the number of positions is limited. In large banks that have special training programs, promotions may come more quickly. For a senior officer position, however, an employee usually needs many years of experience.

Although experience, ability, and leadership are emphasized for promotion, advancement also may be accelerated by special study. Courses in every phase of banking are offered by the American Institute of Banking, a long-established, industry-sponsored school. (See the statement on the Banking Industry elsewhere in the *Handbook* for more information on the Institute's

laws and regulations. An officer must have a broad knowledge of business activities to relate to the operations of his department. For example, loan officers evaluate the credit and collateral of individuals and businesses applying for a loan. Similarly, trust officers must understand each account before they invest funds to support families, send young people to college, or pay retirement pensions. Besides supervising financial services, officers advise individuals and businessmen and participate in community projects.

Because banks offer many services, a wide choice of careers is available to those who specialize.

Loan officers must be familiar with economics, production, distribution, merchandising, and commercial law. They also need to know business operations and be able to analyze financial statements. Officers may handle installment, commercial, real estate, or agricultural loans.

Trust management requires knowledge of financial planning and investment for investment research and estate and trust administration. Operations officers plan, coordinate, and control the work flow; update systems; and strive for bank efficiency. They also train and supervise a large number of people. Careers in bank operations include electronic data processing and internal and customer services.

A correspondent bank officer is responsible for relations with other banks; branch bank manager, for all functions of a branch office; and an international officer, for advising customers with financial dealings abroad. A working knowledge of a foreign country's language, geography, politics, history, and economic growth can help those interested in international banking.

Other career fields for bank officers are auditing, economics, personnel administration, public relations, and operations research.

program and other training programs sponsored by universities and local bankers' associations.)

Employment Outlook

Through the mid-1980's, employment of bank officers is expected to increase rapidly. Computers will be used to expand banking activities; additional officers will be required for sound management and control and to replace those who retire or leave their jobs for other reasons.

Although college graduates who meet the standards for executive trainees should find good opportunities for entry positions, many senior officer positions will be filled by promoting people already experienced in banking. Competition for these promotions, particularly in large banks, is likely to be keen.

Earnings

According to a private survey conducted in 1972, large banks, insurance companies, and other financial institutions paid salaries ranging from \$550 to \$780 a month to new executive trainees who were college graduates.

The salaries of senior bank officers may be several times as great as these starting salaries. For officers, as well as for other bank employees, earnings are likely to be lower in small towns than in big cities.

See the statement on the Banking Industry elsewhere in the *Handbook for Places of Employment and Sources of Additional Information*, and for general information on banking occupations.



City manager discusses urban renewal project with staff.

CITY MANAGERS

(D.O.T. 188.118)

Nature of the Work

Population growth and industrial expansion place increasing pressure on housing, transportation, and other facilities of cities. Problems associated with growing modern communities, such as air and water pollution and rising crime rates, also demand attention. To cope effectively with these problems, sophisticated management techniques are required. Consequently, many communities hire a specialist who has these skills—the city manager.

A city manager is responsible to the community's elected officials who appoint him. Although duties vary by city size, city managers generally coordinate and administer activities of operating departments, such as tax collection and disburse-

ment, law enforcement, and public works; hire department heads and their staffs; and prepare the annual budget to be approved by elected officials. They also study current problems, such as unionization of government employees or urban renewal, and report their findings to the elected council.

City managers must plan for future growth and development of cities and surrounding areas. To provide for an expansion of public services, they frequently appear at civic meetings to advocate certain programs or to inform citizens of current government operations.

City managers work closely with planning departments to coordinate new and existing programs. In smaller cities that have no permanent planning staff, coordination may be assumed entirely by the manager.

Many cities employ assistant city managers, department head

assistants, and administrative assistants to aid city managers. Under his direction, they administer programs, prepare reports, receive visitors, answer correspondence, and generally help to keep the city functioning smoothly. Assistant city managers organize and coordinate city programs, supervise city employees, and act for the city manager when he is absent. They also may assume responsibility for some projects, such as the development of a preliminary annual budget. Department head assistants generally are responsible for one activity, such as personnel, finance, or law, but also may assist in other areas. Administrative assistants, also called executive assistants or assistants to the city manager, usually do administrative and staff work in all departments under the city manager. For instance, they may compile operating statistics, or review and analyze work procedures.

Places of Employment

About 2,500 city managers, nearly all of them men, were employed in 1972. In addition, several thousand persons worked as administrative assistants, department head assistants, and assistant city managers. About nine out of ten city managers worked for cities and counties having a council-manager form of government. Most of the remainder worked in municipalities having other forms of government, such as mayor-council government in which the mayor appoints the city manager as his "administrative assistant" or "chief administrative officer." A few city managers also worked for metropolitan or regional planning organizations and councils of governments.

Although four-fifths of all city managers work for small cities with

populations less than 25,000, most larger cities also employ a city manager. About half of the cities with populations between 10,000 and 500,000 have city managers. City managers work in all States except Hawaii and Indiana, but one-half are concentrated in Eastern United States.

Training, Other Qualifications, and Advancement

A bachelor's degree, preferably with a major in political science or public administration, is the minimum educational background needed to become a city manager. However, a master's degree in public or municipal administration is preferred.

In 1972, about 90 colleges and universities offered graduate degree programs in public or municipal administration. Degree requirements in some schools include successful completion of an internship program in a city manager's office. During this internship period, which may last from 6 months to a year, the degree candidate observes local government operations and does research under the direct supervision of the city manager.

Most new graduates work as administrative assistants to city managers for several years and gain experience in solving urban problems, coordinating public services, and management techniques. Others work in an area of government operations such as finance, public works, or public planning. They may acquire supervisory skills and additional experience by working as assistant city manager or department head assistant in operations. City managers first are employed in small cities, but during their careers, they usually work in several cities of increasing size to gain experience.

Young persons who plan a career in city management should like to work with detail and as part of a team. They must have sound judgment, self-confidence, and be able to perform well under stress. To handle emergency situations, city managers must quickly isolate problems, identify their causes, and provide alternate solutions. City managers should be tactful and able to communicate with and work well with people.

City managers also must be dedicated to public service since they often put in long hard hours in times of crises.

Employment Outlook

This small occupation is expected to grow very rapidly as problems of our growing cities become complex. Examples of this complexity are computerized data collection of police information, advances in technology of traffic control, and the application of systems analysis to urban problems. The demand for city managers also will increase as cities convert to the council-manager form of government, currently the fastest growing form of city government. Furthermore, city managers will be needed in places having other forms of government to help elected officials cope with day-to-day operations of government.

Persons who seek beginning city management jobs as administrative assistants, department head assistants, or assistant city managers may face competition through the mid-1980's, especially if they do not have a graduate degree in public administration or related management experience. Competition should be keen among the growing number of administrative assistants, department head assistants, and assistant city managers for the relatively few city manager positions.

Earnings and Working Conditions

Salaries of city managers and their assistants vary according to their education and experience as well as job responsibility and size of city. Generally, city manager's earnings are very high relative to the average earnings for nonsupervisory workers in private industry, except farming. In 1972, annual salaries of city managers ranged from about \$12,000 in cities of 5,000 to more than \$35,000 in cities of more than 250,000, according to the International City Management Association. In cities of 10,000 or more, seven out of ten city managers were paid at least \$20,000. City managers in cities not having council-manager governments received slightly less.

Salaries of assistant city managers and department head assistants ranged from about \$10,000 in small cities to more than \$25,000 in large ones. They were generally paid about three-fourths the salaries paid city managers. Administrative assistant salaries typically ranged from \$8,500 to \$10,000, annually.

City managers often work more than 40 hours a week. Emergency problems may require evening and weekend work and meetings with individuals and citizen's groups consume additional time.

Fringe benefits usually include health and life insurance programs, pension plans, sick leave, vacation time, and often a car for official business. Managers generally are reimbursed for expenses incurred while attending professional meetings and seminars.

Sources of Additional Information

International City Management Association, 1140 Connecticut Ave. NW., Washington, D.C. 20036.



COLLEGE STUDENT PERSONNEL WORKERS

(D.O.T. 045.108, 090.118, 090.168, 129.108 and 166.168)

Nature of the Work

A student's choice of a particular institution of higher education for further study is influenced by many factors. Availability of a specific educational program, quality of the school, and cost, as well as proximity to home, may all play important roles.

For many students, an equally important standard is the institution's ability to provide for their housing, social, cultural, and recreational needs. Development and administration of the latter services, and of similar programs serving students' well-being in addition to their educational needs, provide a wide variety of jobs for college student personnel workers. The admissions officer, registrar, the dean of students, and the career planning and placement

counselor are probably the best known among these. Some other types of workers that may make up this broad occupational field are student activities and college union personnel, student housing officers, counselors in the college counseling center, financial aid officers and foreign student advisors.

Titles of student personnel workers vary from institution to institution and from program to program within a single school. Titles also vary with the level of responsibility within a certain student personnel program. The more common titles include dean, director, officer, associate dean, assistant director, and counselor.

The *dean of students*, or the vice president for student affairs, heads the student personnel program at a school. Among his duties, he evaluates the changing needs of the students and helps the president of the college develop institutional policies. The dean of students generally coordinates a staff of associate or assistant deans; these

are in charge of the specific programs that deal directly with the students.

At some schools, the admissions office and the records office are separate. *Admissions Counselors* interview and evaluate prospective students and process their applications. They may travel extensively to recruit high school, junior college and older students and to acquaint them with opportunities available at their College. They work closely with faculty, administrators, financial aid personnel and public relations staff to determine policies for recruiting and admitting students. Personnel in the office of the *registrar* maintain the academic records of students, and provide current enrollment statistics for communication both within the college and between the college and the community.

Student financial aid personnel assist students in obtaining financial support to pay for their education. Workers in this field must keep well informed about sources of financial aid, funding, and about management of all forms of financial aid—scholarships, grants, loans, student employment, fellowships, teaching and research assistantships. They work closely with administrators, the admissions, counseling, business, and academic office staffs.

Career planning and placement counselors, sometimes called college placement officers, assist students in making long-range career selections and may also help students get part-time and summer jobs. On many campuses, they arrange for prospective employers to visit the school to discuss their firm's personnel needs and to interview applicants. (For further information on this field, see statement on College Career Planning and Placement Counselors).

The student personnel staff in charge of *student activities* work

with members of proposed and established student organizations, especially with student government. They help the student groups to plan, implement, and evaluate their activities. Often, the student activities staff will assist in the orientation of new students.

College union staff members work with students to provide intellectual, cultural, and recreational programs. Many college union staff members are responsible for directing the operation of the physical facilities and services of the building, such as food and recreational services, building maintenance, fiscal planning, conference facilities, and employee supervision.

Student housing officers sometimes live in the dormitories and, in general, help the students to live together in harmony. They may serve as counselors to individual students with personal problems. Housing officers also may be involved in managing the fiscal, food service, and housekeeping operation of student residences.

Counselors help students with personal, educational, and vocational problems. Students may come to the counselors on their own or be referred by a faculty member, a residence hall counselor, or a friend. Topics of discussions may include lack of self-confidence or motivation on the part of the student, failure in academic work, desire to leave college or transfer to another college, inability to get along with others, loneliness, drug abuse, or marriage problems. In addition, there is a growing trend for counselors to try to reach more students by establishing group sensitivity sessions and telephone "hotlines". Counselors often administer tests that indicate aptitudes and interests to students having trouble understanding themselves. Some also teach in the college or assist with admissions, orienta-

tion and training of residence hall staff. (For further information on this field, see statement on Psychologists.)

Foreign student advisers administer and coordinate many of the services which are crucial in insuring a successful academic and social experience for students from other countries. They usually assist with foreign student admissions, orientation, financial aid, housing, English as a foreign language, academic and personal advising, student-community relationships, placement, and alumni relations. In addition they may be an adviser for international associations and nationality groups and for United States students interested in study, educational travel, work, or service projects abroad.

Places of Employment

An estimated 35,000 to 40,000 college student personnel workers, roughly one-third of them women, were employed in 1972. Every college and university, whether a two-year or a four-year school, has a staff performing student personnel functions. They are not always organized as a unified program. Large colleges and universities generally have specialized staffs for each personnel function. However, in many small colleges the entire student personnel program may be carried out by just a few persons.

Training, Other Qualifications, and Advancement

Because of the diversity in duties, the education and backgrounds of college student personnel workers vary considerably. A bachelor's degree is the minimum requirement; however, for some student personnel programs it is necessary to have a master's degree, and others in the field have doctoral degrees.

In 1972, more than 100 colleges and universities offered graduate programs in student personnel work. However, many employers prefer instead a graduate degree in a specific academic field added to some courses in student personnel work. A master's degree in clinical or counseling psychology is usually required for work as a college counselor. This degree also is helpful in other student personnel fields such as career planning and placement. Business administration also is helpful, especially for those who wish to go into the admissions, records, college union, financial aid, or student housing fields. Familiarity with data processing is an asset especially for work in admissions, records, or financial aid. Social science and recreation degrees also are useful, as is work experience in business, government, or educational associations. The majority, however, have degrees in education or the social sciences.

College student personnel workers must be interested in, and able to work with, people of all backgrounds and ages. They must have the patience to cope with conflicting viewpoints of students, faculty, and parents. People in this field often deal with the unexpected and the unusual, therefore emotional stability and the ability to function while under pressure are necessities.

Entry-level positions are usually those of student activities advisors, admissions counselors, financial aid counselors, residence hall directors, and assistants to deans. Persons without graduate degrees may find advancement opportunities limited. A doctorate is usually necessary for the top student personnel positions.

Employment Outlook

Employment of college student personnel workers is likely to remain

relatively stable through the mid-1970's. Tightening budgets, in both public and private colleges and universities, is the chief factor underlying this expected stability in employment. Student personnel positions least likely to be affected if some reduction in number becomes necessary are those most closely tied to the academic function of the school—admissions, financial aid, records, and counseling. The number of graduate programs in student personnel is continuing to grow as is the number of graduates, a situation which the National Association of Student Personnel Administrators feels could result in competition for jobs in this field. Over the short run, until colleges and universities resolve their financial difficulties, most openings each year will result from the need to replace personnel who transfer to other positions, retire, or leave the field for other reasons.

After the mid-1970's, however, employment of student personnel workers is expected to increase as colleges provide more services for students, especially the growing number from low-income and minority families who often require special counseling and assistance. The increasing number of college students, particularly in junior and community colleges, is a factor which also could contribute to some growth in the student personnel occupations, especially if financial problems should ease. Two-year public colleges, for the most part, have less serious financial problems because, unlike most four-year colleges, their enrollments are growing and their operating costs are moderate.

Earnings and Working Conditions

Median salaries of *chief student affairs officers* ranged from \$11,900

in small non-public colleges to \$26,000 in large public universities in 1972, according to a National Education Association survey of public and private colleges and universities. Median salaries of *deans of admissions* ranged from \$11,062 to \$19,400; for *registrars*, from \$8,130 to \$17,725. *Directors of student testing and counseling* had median salaries of \$9,900 to \$19,800. The median salaries of the other student personnel workers were somewhat lower.

College student personnel workers frequently work more than a 40-hour week; often irregular hours and overtime work are necessary. Employment in these occupations is usually on a 12-month basis. In many schools, they are entitled to retirement, group medical and life insurance, sabbatical and other benefits.

Sources of Additional Information

A pamphlet, *Careers in Higher Education*, is available from:

The American Personnel and Guidance Association, 1607 New Hampshire Ave. N.W., Washington, D.C. 20009.

CREDIT OFFICIALS

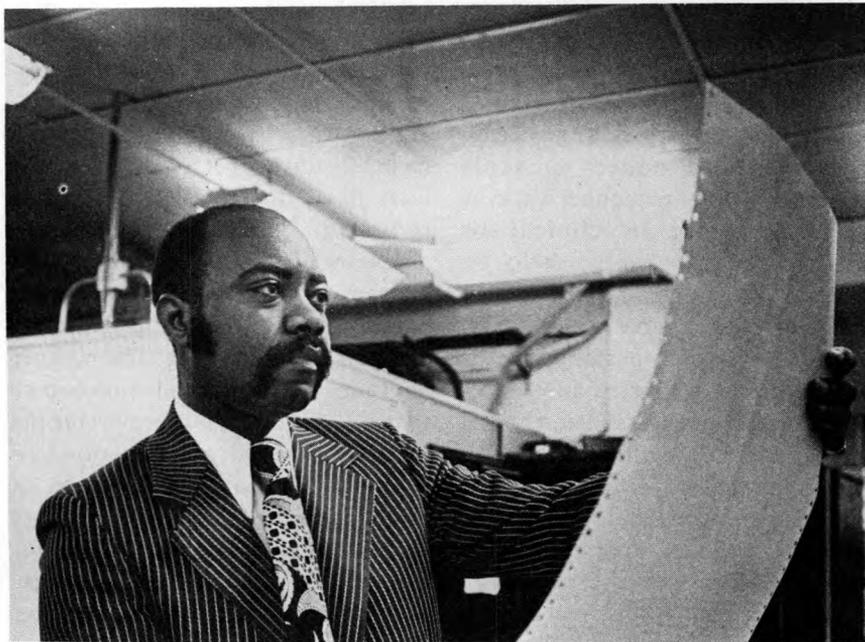
(D.O.T. 168.168 and 186.288)

Nature of the Work

Many daily activities of businesses and individuals depend upon receiving goods and services on credit or obtaining cash loans. In most forms of credit granting, a credit official makes the decision to accept or reject the application. These workers include *credit managers*, who authorize customer purchases when payment is promised at a later date, and *loan officers*, who approve cash loans by financial institutions.

In extending credit to a business (commercial credit), the credit official analyzes detailed financial reports submitted by the applicant, interviews a company representative about its management, and reviews credit agency reports to determine the firm's reputation for repaying debts. He also checks at banks where the company has deposits or previously was granted credit. In extending credit to individuals (consumer credit), detailed financial reports usually are not available. The credit official must rely more on personal interviews, credit bureaus, and banks to provide information about the person applying for credit.

Loan officers in many large banks make decisions based on their analysis of reports submitted by credit analysts. Officers may specialize in handling certain types of credit, such as installment loans, commercial loans, real estate mortgages, and agricultural loans. In smaller financial institutions, such as branch banks and consumer finance companies, the loan officer (who sometimes is the manager of the firm) may do all the work of granting loans himself. He may interview applicants, analyze the information gained in the interview, and make the final lending decision.



Credit manager reviews previous credit transactions from computer printout.

Credit managers in retail and wholesale trade usually cooperate with the sales department in developing credit policies liberal enough to allow the company's sales to increase and yet strict enough to deny credit to customers whose ability to pay their debts is questionable.

A credit manager frequently must contact a customer who is unable or refuses to repay his debt. He does this through writing, telephoning, or personal contact. If these attempts at collection fail, the credit manager may refer the account to a collection agency or assign an attorney to take legal action. Some credit managers supervise workers who gather information, analyze facts, and perform general office duties in a credit department; they include *investigation clerks*, *application clerks*, *credit authorizers*, *information clerks*, *credit collectors*, *adjustment clerks*, *bookkeepers*, and *secretaries*.

Places of Employment

More than 110,000 credit officials

were employed in 1972; most were men. About 75,000 were credit managers working in wholesale and retail stores, in manufacturing firms, and for services that process a company's credit operations. Loan officers working in banks and other financial institutions numbered about 40,000. In addition, some other bank officers, general managers, and office managers spend part of their time supervising the granting of credit within their companies.

Although goods and services are sold on credit, and cash loans granted, throughout the United States, most credit officials work in urban areas where many financial and business establishments are located.

Training, Other Qualifications, and Advancement

A college degree is becoming increasingly important for entry level jobs as credit officials. Employers usually seek persons who have majored in business administration,

economics, or accounting, but may instead hire graduates holding liberal arts degrees. Some employers promote high school graduates to credit official positions if they have experience in credit collection or processing credit information.

The new credit official may be hired as a management trainee and work under the guidance of more experienced personnel in the credit department. Here he gains a thorough understanding of the company's credit procedures and policies and learns various sources of credit information. He may analyze previous credit transactions to learn how to recognize which applicants should prove to be good customers. The trainee also learns to deal with credit bureaus, banks, and other businesses that can provide information on the past credit dealings of their customers.

Many formal training programs are available through the educational branches of the associations that serve the credit and finance field. This training includes home study, college and university programs, and special instruction to improve beginners' skills and keep experienced credit officials aware of new developments in their field. Many banks will pay tuition for loan officers who take courses in credit and finance at colleges and universities.

A person interested in a career as a credit official should be able to analyze detailed information and draw valid conclusions based on this analysis. Because it is necessary to maintain good customer relationships, a pleasant personality and the ability to speak and write effectively also are characteristics of the successful credit official.

The work performed by credit officials allows them to become familiar with almost every phase of their respective businesses. Highly

qualified and experienced officials can advance to top-level executive positions. However, in small and medium-sized companies, such opportunities are limited.

Employment Outlook

Employment of credit officials is expected to increase rapidly through the mid-1980's as the number of individual credit transactions continues to grow. In addition to opportunities resulting from growth, many jobs will open each year from the need to replace those who leave the occupation.

Although the increasing use of computers for storing and retrieving information will allow individual credit officials to serve more customers, this should not slow the growth of the occupation. As companies handle greater numbers of credit transactions, the credit official will spend more time managing and supervising the credit handling process in his firm. Moreover, many duties of credit officials, such as customer counseling and interviewing applicants, demand the tact and good judgment only personal contact can provide.

In addition, attractive credit terms are a major tool for increasing the sales volume of almost any business. As firms strive to maximize their sales, in the face of competition, there will be a greater demand for skilled credit officials who can establish credit policies strict enough to minimize bad debt losses.

Earnings and Working Conditions

In 1972, beginning credit officials earned annual salaries that ranged from about \$7,500 to just over \$10,000, depending on the type of credit granting performed and the geographic location of the job. Bank of-

ficers hired as trainees earned annual starting salaries of about \$8,500. The Nation's largest banks and major business firms, however, may offer slightly higher salaries to entry level credit officials.

As credit officials gain experience and reach middle management positions, their earnings usually range from \$10,000 to \$20,000 a year; with the largest employers, earnings may be as high as \$25,000 or more. Some individuals in top-level positions earned salaries well over \$40,000 a year.

According to a Bank Administration Institute survey conducted in May of 1971, salaries of loan officers were generally highest in the Northeast and Middle Atlantic regions and lower in the South.

Credit officials normally work the standard workweek of their company—35-40 hours. Some work longer hours, particularly in retail trade where a seasonal increase in credit sales can produce a greater work volume.

Sources of Additional Information

General information about the field of consumer credit, including career opportunities, is available from:

The National Consumer Finance Association, 1000 16th St. NW., Washington, D.C. 20036.

Specific information about training programs available in consumer credit may be obtained from:

Society of Certified Consumer Credit Executives, 7405 University Dr., St. Louis, Mo. 63130.

For information about training programs available in commercial credit write:

Credit Research Foundation, 3000 Marcus Ave., Lake Success, N.Y. 11040.

HOTEL MANAGERS AND ASSISTANTS

(D.O.T. 163.118 and 187.118 and .168)

Nature of the Work

Hotel managers are responsible for profitably operating their establishments and providing maximum comfort for their guests. More than 110,000 managers worked in hotels and motels in 1972; 40,000 of these were self-employed. Managers direct and coordinate the activities of the front office, kitchen, and dining rooms; and various hotel departments including housekeeping, accounting, personnel, and maintenance. They determine room rates, establish credit policy, and have final responsibility for solving the many problems that arise in operating their hotels. Like other business managers, they may confer with business and social groups and participate in community affairs.

In small hotels, the manager also may do much of the front office clerical work. In the smallest hotels and in many motels, the owners—sometimes a family team—completely run the business.

The general manager of a large hotel may have several assistants who manage departments and assume general administrative responsibilities when he is absent. Because preparing and serving food is important in the operation of most large hotels, a special manager usually is in charge of this department. Managers of large hotels usually employ a sales manager to advertise hotel facilities for meetings, banquets, and conventions.

Since large hotel chains often centralize activities such as purchasing and planning employee training programs, managers in these hotels may have a smaller range of duties than those in independently owned estab-



Hotel manager makes final arrangements for a convention.

lishments. Hotel chains may assign managers to organize either a newly acquired hotel, or to establish hotels in different cities or in foreign countries.

Training, Other Qualifications, and Advancement

Although experience is generally the most important consideration in selecting managers, employers are increasingly emphasizing college education. Many believe a 4-year college curriculum in hotel and restaurant administration is the best educational preparation. Courses in hotel work, available in a few junior colleges and through the American Hotel and Motel Association, also are helpful.

College level courses in hotel management include hotel administration, accounting, economics, food service management and catering, and hotel maintenance engineering. Students are encouraged to work in hotels or restaurants during summer vacations. The experience gained and the contacts made with employers may help them to get better hotel jobs after graduation.

Managers should have initiative, self-discipline, and the ability to organize work and run a department or hotel. They must be able to concentrate on details and solve problems.

Some large hotels have special on-the-job management trainee programs in which trainees rotate among various departments. Outstanding employees may receive financial assistance for college study.

Most hotels promote employees with proven ability, usually front office clerks, to assistant manager and eventually to general manager. Hotel chains may offer better opportunities for advancement than independent hotels, since vacancies may arise anywhere in the chain or central office.

Employment Outlook

Hotel manager employment is expected to increase very rapidly through the mid-1980's. New positions will arise as additional hotels and motels are built. Many openings for management personnel also will occur as workers die, retire, or transfer to other jobs. Applicants having college degrees in hotel administration will have an advantage in seeking entry positions and later advancement.

See the Hotel statement elsewhere in the *Handbook* for information on Earnings and Working Conditions, Sources of Additional Information, and additional information on Employment Outlook.

INDUSTRIAL TRAFFIC MANAGERS

(D.O.T. 184.168)

Nature of the Work

Industrial firms want to receive raw materials and deliver customers' goods promptly, safely, and with minimum cost. Arranging the transportation of materials and finished products is the job of an industrial traffic manager. Industrial traffic managers analyze various transportation possibilities and choose the most efficient type for their companies' needs—rail, air, road, water,

pipeline, or some combination. Then they select the route and the particular carrier. To make their decisions, managers consider factors such as freight classifications and regulations, time schedules, size of shipments, and loss and damage rates. (This statement does not cover traffic managers who sell transportation services for railroads, airlines, trucking firms, and other freight carriers.)

Activities of industrial traffic managers range from checking freight bills to deciding whether the company should buy its own fleet of trucks rather than contract for services. They route and trace shipments, arrange with carriers for transportation services, prepare bills of lading and other shipping documents, and handle claims for lost or damaged goods. Traffic managers keep records of shipments, freight rates, commodity classifications, and applicable government regulations. They also must stay informed about changing transportation technology, such as containerization (the use of containers packed with many individual items). Some traffic managers (called physical distribution managers) are responsible for packaging shipments and maintaining warehouse facilities and transportation equipment.

Traffic managers often consult with other company officials about the firm's transportation needs. They may, for example, work with production department personnel to plan shipping schedules, or with members of the purchasing department to determine what quantities of goods can be transported most economically.

Since many aspects of transportation are subject to Federal, State, and local government regulations, traffic managers must know about these and any other legal matters that apply to their companies' shipping operations. High level traffic

managers represent their companies before ratemaking and regulatory bodies such as the Interstate Commerce Commission, State commissions, and local traffic bureaus.

Places of Employment

More than 20,000 persons were industrial traffic managers in 1972. Although most jobs are found in manufacturing firms, some traffic managers work for large stores. A few are self-employed consultants, or work for firms that handle transportation problems for clients. Most traffic managers are men.

Training, Other Qualifications, and Advancement

Although high school graduates with experience in traffic departments sometimes are hired as traffic managers, a college education is becoming increasingly important in this field. For some kinds of work, college training is required. For example, in order to argue cases before the Interstate Commerce Commission, a traffic manager must meet standards that include at least 2 years of college. Although some employers prefer graduates who have a degree in traffic management, others seek liberal arts majors who have had courses in transportation, management, economics, statistics, marketing, or commercial law.

Industrial traffic training is available through colleges and universities, traffic management schools, and seminars sponsored by private organizations. More than 100 colleges, universities, and junior colleges offer a degree in traffic management.

Industrial traffic managers should be able to analyze numerical and technical data such as freight rates and classifications to solve transportation problems. These jobs also require the ability to work independ-



Industrial traffic manager checking freight bills.

ently and to present facts and figures in a convincing manner.

Newly hired traffic managers often complete shipping forms and calculate freight charges. After gaining experience, they do more technical work such as analyzing transportation statistics. A competent worker may advance to a supervisory job such as supervisor of rates and routes; a few are promoted to assistant general traffic managers and eventually to general traffic managers. Industrial traffic managers can sometimes help their chances for advancement by participating in company-sponsored training programs or taking other courses in traffic management.

Employment Outlook

Employment of industrial traffic managers is expected to increase slowly through the mid-1980's as more businesses centralize their ship-

ping and receiving activities in separate departments. A few openings will become available each year as new jobs are created, and as traffic managers die, retire, or leave the field for other reasons.

Growth in this occupation will stem from an increasing emphasis on efficient management of traffic activities and from the trends toward procuring materials over greater distances and distributing products in wider markets. There will be a strong demand for specialists who can obtain the lowest possible freight rates.

Earnings and Working Conditions

Industrial traffic managers, salaries started at about \$9,000 a year in 1972, according to the limited information available. Although the earnings of experienced traffic managers vary by the company's transportation costs, they are much higher than the average for all nonsuper-

visory workers in private industry, except farming. Industrial traffic managers working for companies whose transportation requirements were small earned about \$16,000 a year. Those in companies whose transportation needs were large received from \$25,000 to \$30,000 a year. Some traffic executives earned \$40,000 or more a year.

Although industrial traffic managers usually have a standard work week, those in particularly responsible jobs may have to spend some time outside regular working hours preparing reports, attending meetings, and traveling to hearings before State and Federal regulatory agencies.

Sources of Additional Information

Information on education and technical training is available from:

American Society of Traffic and Transportation, Inc., 547 West Jackson Boulevard, Chicago, Ill. 60606.

LAWYERS

(D.O.T. 110.108, .118, and 119.168)

Nature of the Work

At some time in our life, each of us may need a lawyer for advice about our rights and responsibilities when buying property, making a will, or settling an estate. In addition, lawyers, also called attorneys, negotiate the settlement of legal problems out of court or, when necessary, represent clients in court or before government agencies.

Most lawyers are engaged in general practice, handling all kinds of legal work for clients. However, a significant number specialize in one

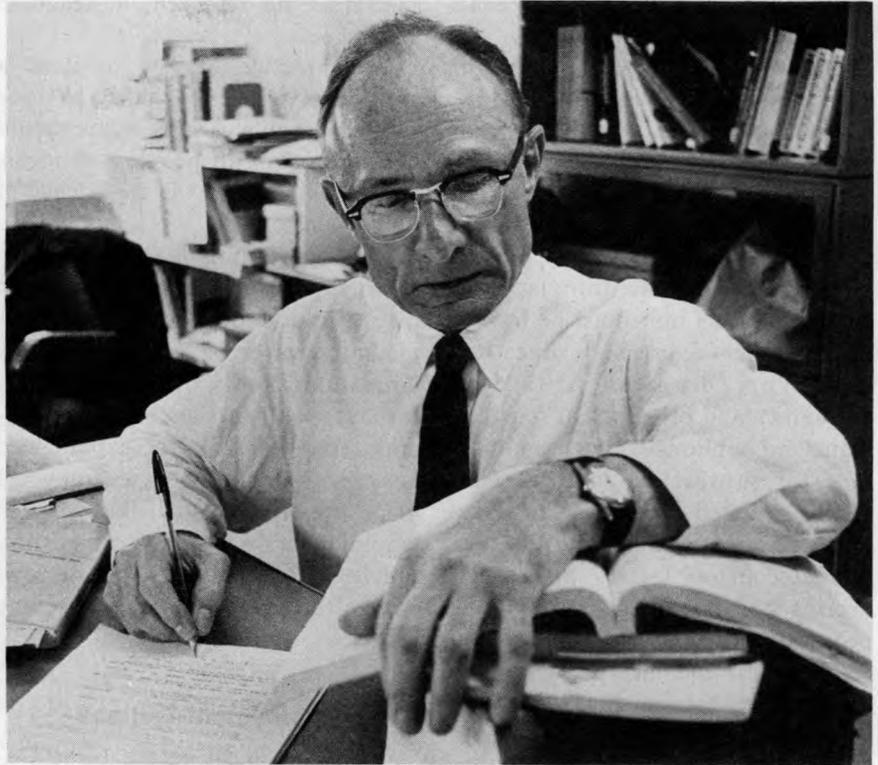
branch of law, such as corporation, criminal, labor, patent, real estate, tax, or international law. Some attorneys devote themselves entirely to trying cases in the courts. Others never appear in court but instead draw up wills, trusts, contracts, mortgages, and other legal documents; conduct out-of-court negotiations; and do investigative and other legal work to prepare for trials. Some may act as trustees by managing a person's property and funds or as executors by seeing that the provisions of their client's will are carried out. Still others teach, do research or writing, or perform administrative work. Government attorneys play a large part in developing Federal and State laws and programs; they prepare drafts of proposed legislation, establish law enforcement procedures, and argue cases.

Many people who have legal training do not work as lawyers but use their knowledge of law in other occupations. They may, for example, be insurance adjusters, tax collectors, probation officers, credit investigators, or claim examiners. A legal background also is an asset to those seeking or holding public office.

Places of Employment

About 300,000 persons, most of them men, worked as lawyers in 1972. Most were in private practice, either self-employed (alone or in partnerships) or working for other lawyers or law firms.

In 1972, almost 15,000 lawyers worked for the Federal Government, chiefly in the Justice, Defense, and Treasury Departments, and the Veterans Administration; another 15,000 were employed by State and local governments. Others worked for private companies or taught in law schools. Some salaried lawyers also have independent practices;



Legal research demands careful attention to detail.

others do legal work part time while in another occupation.

Training, Other Qualifications, and Advancement

In order to practice law in the courts of any State, a person must be admitted to its bar. Applicants for admission to the bar must pass a written examination; however, a few States drop this requirement for graduates of their own law schools. A lawyer who has been admitted to the bar in one State usually can be admitted in another without taking an examination provided he meets that State's standards of good moral character and has a specified period of legal experience. Each Federal court or agency sets its own qualifications for those practicing before it.

To qualify for the bar examination in most States, an applicant

must have completed 3 years of college and have graduated from a law school approved by the American Bar Association or the proper State authorities. A few States accept the study of law wholly in a law office or in combination with study in a law school; only California accepts study of law by correspondence as qualification for taking the bar exam. Several States require registration and approval of students by the State Board of Examiners, either before they enter law school, or during the early years of legal study. In a few States, candidates must complete clerkships before they are admitted to the bar.

The required college and law school work usually takes 7 years of full-time study after high school—4 years of college followed by 3 years in law school. Although a number of law schools accept students after 3 years of college, and a few after 2, an increasing number require appli-

cants to have a bachelor's degree. To meet the needs of students who can attend only part time, a number of law schools have night divisions which usually require 4 years of study. In 1971, about one-fourth of all law students in ABA-approved schools were enrolled in evening classes.

Law schools seldom specify college subjects that must be included in students' prelegal education. However, English, history, economics and other social sciences, logic, and public speaking are important for prospective lawyers. Students interested in a particular aspect of the law may find it helpful to take related courses; for example, engineering and science courses for the prospective patent attorney, and accounting for the future tax lawyer. Acceptance by most law schools depends on the applicant's ability to demonstrate an aptitude for the study of law, usually through the "Law School Admissions Test." In 1972, 149 law schools were approved by the American Bar Association. Others—chiefly night schools—were approved by State authorities only.

The first 2 years of law school generally are devoted to fundamental courses such as contracts, property law, and judicial procedure. In the third year, students may elect specialized courses in fields such as tax, labor, or corporation law. Practical experience is often acquired by participation in school-sponsored legal aid activities, in the school's practice court where students conduct trials under the supervision of experienced lawyers, and through writing on legal issues for the school's law journal. Graduates receive the degree of *juris doctor* (J.D.) from most schools, although some confer the *bachelor of laws* (L.L.B.) as the first professional degree. Advanced study is often desirable for those planning to

specialize, do research, or teach in law schools.

The practice of law involves a great deal of responsibility. Young people planning careers in law should like to work with people and ideas, and be able to win the confidence of their clients.

Most beginning lawyers start in salaried positions, although some go into independent practice immediately after passing the bar examination. Newly hired salaried attorneys usually act as research assistants (law clerks) to experienced lawyers or judges. After several years of progressively responsible salaried employment, many lawyers go into practice for themselves. Some lawyers, after years of practice, become judges.

Employment Outlook

A rapid increase in the number of law school graduates seeking employment is expected to create keen competition for the available jobs. Graduates of well known law schools and those who rank high in their classes should find salaried positions with law firms, on the legal staffs of corporations and government agencies, and as law clerks for judges. Graduates of less prominent schools and those with lower scholastic ratings may experience some difficulty in finding salaried jobs. However, many will find opportunities in fields where legal training is an asset but not normally a requirement.

The employment of lawyers is expected to grow moderately through the mid-1980's as increased business activity and population create a demand for attorneys to deal with a growing number of legal questions. Supreme Court decisions extending the right to counsel for persons accused of lesser crimes, the growth of legal action in the areas of consumer

protection, the environment, safety, and an expected increase in the use of legal services by middle income groups through prepaid legal service programs also should provide employment opportunities. Other jobs will be created by the need to replace lawyers who retire or leave the occupation for other reasons.

Prospects for establishing a new practice probably will continue to be best in small towns and expanding suburban areas. In such communities competition is likely to be less than in big cities and new lawyers may find it easier to become known to potential clients; also, rent and other business costs are somewhat lower. Salaried positions, on the other hand, will be limited largely to urban areas where the chief employers of legal talent—government agencies, law firms, and big corporations—are concentrated.

Earnings and Working Conditions

Lawyers entering practice in 1972 earned starting salaries ranging from \$7,000 to \$20,000 a year. Factors affecting the salaries offered to new graduates include: their academic records; and types, sizes, and locations of their employers; and whether the new lawyer has any specialized educational background that the employer requires. Lawyers with 1 year's experience working for manufacturing and business firms earned about \$14,000 a year; those with a few years of experience earned \$18,000 annually. In the Federal Government, annual starting salaries for attorneys were \$11,614 or \$13,996 in early 1973 depending upon their academic and personal qualifications. Those with a few years of experience earned \$19,700 a year. On the average, lawyers earn over three times as much as nonsupervisory workers in private industry, except farming.

Beginning lawyers engaged in legal aid work usually receive the lowest starting salaries. New lawyers starting their own practices may earn little more than expenses during the first few years and may need to work part time in other occupations.

Lawyers on salary receive increases as they assume greater responsibility. In 1972, those in charge of legal staffs in private industry averaged more than \$33,700 a year. Incomes of lawyers in private practice usually grow as their practices develop. Private practitioners who are partners in law firms generally earn more than those who practice alone.

Lawyers often work long hours and are under considerable pressure when a case is being tried. In addition, they must keep abreast of the latest laws and court decisions. However, since lawyers in private practice can determine their own hours and workload, many stay in practice well past the usual retirement age.

Sources of Additional Information

The specific requirements for admission to the bar in a particular State may be obtained at the State capital from the clerk of the Supreme Court or the secretary of the Board of Bar Examiners.

Information on law as a career is available from:

Information Service, The American Bar Association
1155 East 60th St.,
Chicago, Ill. 60637.

Information on specific topics such as developments in financial aid and law school accreditation is available from:

Association of American Law Schools,
Suite 370, 1 Dupont Circle NW,
Washington, D.C. 20036.

MARKETING RESEARCH WORKERS

(D.O.T. 050.088)

Nature of the Work

Businessmen require a great deal of information to make sound decisions on how to market their products. Marketing research workers provide much of this information by analyzing available data on products and sales, making surveys, and conducting interviews. They prepare sales forecasts and make recommendations on product design and advertising.

Most marketing research starts with the collection of facts from sources such as company records, published materials, and experts on the subject under investigation. For example, marketing research workers making sales forecasts may begin by studying the growth of sales volume in several different cities. This growth may then be traced to increases in population, size of the company's sales force, or amount of money spent on advertising. Other

marketing research workers may study changes in the quantity of company goods on store shelves or make door-to-door surveys to obtain information on company products.

Marketing research workers are often concerned with customer's opinions and tastes. For example, to help decide on the design and price of a new line of television sets, marketing research workers may survey consumers to find out what styles and price ranges are most popular. This type of survey usually is supervised by marketing researchers who specialize in consumer goods; that is, merchandise sold to the general public. They may be helped by statisticians who select a group (or sample) to be interviewed and "motivational research" specialists who phrase questions to produce reliable information. Once the investigation is underway, the marketing research worker may supervise the interviewers. He also may direct the office workers who tabulate and analyze the information collected.

Marketing surveys on products used by business and industrial firms



Marketing research worker reviews results of survey.

may be conducted somewhat differently from consumer goods surveys. The marketing researcher often conducts the interviews himself to gather opinions of the product. He also may speak to company officials about new uses for it. He must therefore have specialized knowledge of both marketing techniques and the industrial uses of the product.

Places of Employment

About 25,000 full-time marketing research workers were employed in 1972; most were men. They included research assistants and others in junior positions as well as supervisors and directors of research. In addition, a limited number of other professionals (statisticians, economists, psychologists, and sociologists) and several thousand clerical workers were employed full time in this field. Thousands of additional workers, many of them women, worked part time or on a temporary basis as survey interviewers.

Most jobs for marketing research workers are found in manufacturing companies and independent advertising and research organizations. Large numbers also are employed by stores, radio and television firms, and newspapers; others work for university research centers and government agencies. Marketing research organizations range in size from one-man enterprises to firms having a hundred employees or more.

The largest number of marketing research workers is in New York City, where many major advertising and independent marketing research organizations are located, and where many large manufacturers have their central offices. The second largest concentration is in Chicago. However, marketing research workers are employed in many other cities—wherever there are central offices of large manufacturing and sales organizations.

Training, Other Qualifications, and Advancement

Although a bachelor's degree is the usual entry requirement for marketing research trainees, graduate training is becoming important for some specialized positions and for advancement to higher level positions. Many graduates qualify for jobs through previous experience in other types of research, while employers may hire university teachers of marketing or statistics to head new marketing research departments.

College courses considered to be valuable preparation for work in marketing research are statistics, English composition, speech, psychology, and economics. Some marketing research positions require skill in specialized areas, such as engineering, or substantial sales experience and a thorough knowledge of the company's products. Knowledge of data processing is helpful because of the growing use of computers in sales forecasting, distribution, and cost analysis.

Trainees usually start as research assistants or junior analysts. At first, they may do considerable clerical work, such as copying data from published sources, editing and coding questionnaires, and tabulating survey returns. They also learn to conduct interviews and write reports on survey finding. As they gain experience, assistants and junior analysts may assume responsibility for specific marketing research projects, or advance to supervisory positions. An exceptionally able worker may become marketing research director or vice president for marketing and sales.

Either alone or as part of a team, marketing research workers must be resourceful as they analyze problems and apply various techniques to their solution. As advisers to management, they should be able to write

clear reports informing company officials of their findings.

Employment Outlook

College graduates trained in marketing research, and statistics will find favorable job opportunities in this occupation through the mid-1980's. The growing complexity of marketing research techniques also will expand opportunities for psychologists, economists, and other social scientists. Job opportunities for those who hold master's and doctor's degrees will be excellent.

The demand for marketing research services is expected to increase very rapidly through the next decade. Existing marketing research organizations will expand and new marketing research departments and independent firms will be set up. Business managers will find it increasingly important to obtain the best information possible for appraising marketing situations and planning marketing policies. Also, as marketing research techniques improve and more statistical data accumulate, company officials are likely to turn more often to marketing research workers for information and advice.

Earnings and Working Conditions

Starting salaries for market research trainees averaged about \$9,000 a year in 1972, according to the limited data available. Persons having masters degrees in business administration and related fields usually started with annual salaries close to \$13,000.

Earnings were greater for experienced marketing research workers who held management positions of high responsibility. Vice presidents of marketing and directors of marketing research often earned between \$25,000 and \$35,000 a year.

Marketing research workers usually work in modern, centrally located offices. Some, especially those employed by independent research firms, do a considerable amount of traveling in connection with their work. Also, they may frequently work under pressure and for long hours to meet deadlines.

Sources of Additional Information

Additional information on careers in marketing research is available from:

American Marketing Association, 230 North Michigan Ave., Chicago, Ill. 60601.



Personnel worker administers test to job applicant.

PERSONNEL WORKERS

(D.O.T. 166.088 through .268)

Nature of the Work

Attracting the best employees available and matching them to jobs they can do effectively are important for the successful operation of business and government. Personnel workers interview, select, and recommend applicants who have the education and experience to fill vacancies. In addition to staffing, they counsel employees, plan training, develop wage and salary scales, and investigate methods to improve personnel operations. Some jobs require only limited contact with people; others involve frequent contact with employees, union representatives, job applicants, and other people outside the organization.

Large organizations employ personnel workers at varying levels of responsibility. Department heads formulate policy, advise company officials on personnel matters, and administer the work of their staffs.

Supervisors and specialists in wage administration, training, safety, and job classification direct the work of staff assistants and clerical employees. Small organizations employ relatively few personnel workers; sometimes one individual performs personnel duties in addition to other work.

Personnel workers in government agencies generally do the same kind of work as those in large business firms. Government personnel workers, however, spend considerably more time classifying jobs, and devising, administering, and scoring competitive examinations given to job applicants.

Places of Employment

In 1972, about 235,000 people—three-fourths of them men—were personnel workers. Well over half worked in private industry

including banks, telephone companies, and department stores. Large numbers also worked in Federal, State, and local government agencies. A few were in business for themselves, often as management consultants or employee management relations experts. In addition, some taught college or university courses in personnel administration, industrial relations, and similar subjects.

Most jobs for personnel workers are located in the highly industrialized sections of the country.

Training, Other Qualifications, and Advancement

A college education is becoming increasingly important for personnel work. Many employers in private industry prefer applicants who have majored in business or personnel administration; people inter-

ested in working for the government should major in public administration, political science, or personnel administration. However, those with other majors also are eligible for government positions.

For some positions, specialized training may be necessary. Testing and counseling often require a bachelor's degree with a major or graduate degree in psychology. An engineering degree may be desirable for work dealing with time studies or safety standards, and training in industrial relations may be helpful for work involving employee management relations. An accounting background is useful for positions concerned with wages, pensions, and other employee benefits.

Although most employers seek college graduates to work in personnel, some prefer workers who already have firsthand knowledge of operations, regardless of their educational preparation. Large numbers now in personnel work who are not college graduates entered the field this way.

New workers usually enter formal or on-the-job training programs to learn how to classify jobs, interview applicants, or perform other personnel functions. After training, they are assigned to work in specific areas.

Personnel workers should speak and write effectively and be able to work with people of all levels of intelligence and experience. They also must be able to see both the employee's and the employer's points of view. In addition, personnel workers should be able to work as part of a team. They need supervisory abilities and must be able to accept responsibility. A personnel worker should like detail, be persuasive, and have a congenial personality.

After gaining experience, personnel workers usually can advance within their own organization or

transfer to other employers. Those in the middle ranks of a big organization often transfer to a top job in a smaller one. Employees with exceptional ability usually are promoted to executive positions, such as personnel director.

Employment Outlook

The number of personnel workers is expected to expand very rapidly through the mid-1980's as employers recognize the need for trained personnel to maintain good employee relations. In addition to new jobs created by growth, many openings will become available each year to replace workers who die, retire, or leave the occupation for other reasons. People trained in psychological testing and in handling work-related problems will find particularly good job prospects. Advancement to personnel positions from production, clerical, or subprofessional jobs will be limited.

Earnings and Working Conditions

Beginning personnel workers in private industry started at \$9,500 a year in 1972, according to a Bureau of Labor Statistics survey in urban areas. Experienced workers earned \$15,000, about twice as much as the average for all nonsupervisory workers in private industry, except farming. Directors of personnel earned between \$14,300 and \$24,700 a year; some top personnel and industrial relations executives in large corporations earned considerably more.

In the Federal Government, inexperienced graduates with bachelor's degrees earned \$7,700 a year in early 1973; those having exceptionally good academic records or one year of graduate work began at \$9,500. Inexperienced workers having a

master's degree and a high class standing started at \$11,600 a year. Personnel workers having high levels of administrative responsibility and several years of experience earned more than \$16,500; some in charge of personnel for major departments in the Federal Government earned more than \$26,800 a year.

Employees in personnel offices generally work 35 to 40 hours a week. During a period of intensive recruitment or emergency, they may work much longer. As a rule, personnel workers are paid for holidays and vacations, and share in the same retirement plans and other benefits available to all professional workers in their organizations.

Sources of Additional Information

General information on careers in personnel work may be obtained from:

American Society for Personnel Administration, 19 Church St., Berea, Ohio 44017.

General information about government careers in personnel is available from:

International Personnel Management Association, 1313 East 60th St., Chicago, Ill. 60637.

PUBLIC RELATIONS WORKERS

(D.O.T. 165.068)

Nature of the Work

How successfully an organization presents itself may affect its public acceptance and influence. Public relations workers help an employer build and maintain a beneficial public image. To accomplish this,

they must understand changing attitudes and opinions of customers, employees, and other groups.

Public relations departments are found in many different organizations, so that workers must tailor their programs to an employer's particular needs. For example, a public relations director for a small college may devote most of his energies to attracting additional students, while one in a business firm may handle the employer's relationship with stockholders, government agencies, and community groups.

Public relations workers gather and give out information that keeps the public aware of their employer's projects and accomplishments. They prepare and assemble information and contact the people who may be

interested in publicizing their material. Many newspaper items, magazine articles, and pamphlets giving information about a company start at public relations workers' desks.

Public relations workers also arrange and conduct direct public contact programs. Such work includes setting up speaking engagements for officials and writing the speeches they deliver. These workers often serve as an employer's representative during community projects and occasionally show films at school assemblies, plan conventions, or manage fund-raising campaigns.

Public relations staffs in large firms sometimes number 200 or more. The director of public relations may develop overall plans and

policies with a company vice-president or another executive having the authority to make final decisions. In addition, large public relations departments employ writers, research workers, and other specialists who prepare material for the different media or write reports sent to stockholders.

Workers who handle publicity for an individual or direct public relations for a university or small business may do all aspects of the job. They make contacts with outsiders, do the necessary planning and research, and prepare material for publication. These workers may combine public relations duties with advertising or managerial work; some are top-level officials and others have lower level positions. The most skilled public relations work of making overall plans and maintaining contacts usually is done by the department director and highly experienced staff members.

Places of Employment

More than 85,000 persons—nearly one-third women—were public relations workers in 1972. In recent years, an increasing number of women have entered the field. Manufacturing firms, stores, and trade and professional associations hire the majority of public relations workers. Others work for consulting firms furnishing public relations services to clients for a fee.

Public relations workers are concentrated in large cities where press services and other communications facilities are readily available, and where many businesses and trade associations have their headquarters. More than half of the public relations consulting firms in the United States are in New York City, Los Angeles, Chicago, and Washington, D.C.



Public relations worker checks material for press release.

Training, Other Qualifications, and Advancement

A college education or journalism experience generally is the best preparation for public relations work. Although most workers major in public relations, journalism, or English, some employers prefer a background in science or some field related to the firm's business. Others, especially small firms, want college graduates with secretarial skills who can combine clerical duties with public relations. Still others want college graduates with at least one year's experience working for the news media. After a few years' experience, these workers may advance to full-time public relations jobs.

In 1972, over 80 colleges and more than 30 graduate schools offered degree programs or special curriculums in public relations. In addition, nearly 200 colleges offered at least one course in this field.

Courses in journalism, business administration, psychology, and public speaking help in preparing for a public relations career. Extracurricular activities, such as writing for a school publication, give valuable experience. Part-time or summer jobs in selling or public relations provide training that can help overcome competition for entry positions.

Creativity, initiative, and the ability to express thoughts clearly and simply are important to the public relations worker. Fresh ideas are so vital in public relations that some experts spend all their time developing new ideas with management, leaving the job of carrying out programs to others.

A person choosing public relations work as a career needs an outgoing personality, self-confidence, and an understanding of human psychology. He should have the enthusiasm necessary to motivate people. Public relations workers need a highly developed sense of competi-

tiveness and the ability to function as part of a team.

Some companies—particularly those with large public relations staffs—have formal training programs for new workers. In other firms, new employees learn by working under the guidance of experienced staff members. Beginners often maintain files of material about company activities, scan newspapers and magazines for appropriate articles to clip, and assemble information for speeches and pamphlets. After gaining experience, they work on progressively more difficult assignments such as writing press releases, speeches, and articles for publication.

Promotion to supervisory jobs may come as the worker shows he can handle more difficult and creative assignments. Some experienced public relations workers start their own consulting firms.

Employment Outlook

Employment of public relations workers is expected to increase moderately through the mid-1980's. In addition to new jobs created as expanding organizations require more public relations specialists, openings will occur because of the need to replace workers who leave the field.

The demand for public relations workers will grow as population increases and the general level of business activity rises. In recent years, public relations spending has increased, and many organizations have developed new public relations departments. This trend should continue in the years ahead.

Earnings and Working Conditions

Starting salaries for men beginning public relations work averaged \$9,000 a year in 1972, according to

the limited data available; entry salaries for newly hired women averaged \$6,900 a year. Many experienced public relations workers earned from \$15,000 to \$25,000 and more a year.

The salaries of experienced workers generally are highest in large organizations having extensive public relations programs. Directors of public relations for medium-sized firms earned \$15,000 to \$30,000 a year; those at large companies had salaries in the \$20,000 to \$50,000 range. Salaries for some officials, such as vice-presidents in charge of public relations, can range from \$25,000 to \$75,000 a year or more. The median salary for directors of public relations was \$21,000 in 1972.

Many consulting firms employ large staffs of experienced public relations specialists and often pay somewhat higher salaries than other business organizations. In social welfare agencies, nonprofit organizations and universities, salaries generally are lower.

Although the workweek for public relations staffs usually is 35 to 40 hours, overtime may be necessary to prepare or deliver speeches, attend meetings and community activities or travel out of town. Occasionally, the nature of their regular assignments or special events requires public relations workers to be on call around the clock.

Sources of Additional Information

Further information about the nature of public relations work is available from:

Service Department, Public Relations News, 127 East 80th St., New York, N.Y. 10021.

Research Department, PR Reporter, Meriden, N.H. 03770.

For additional career information and a list of schools offering degrees

and courses in the field write:

Career Information, Public Relations
Society of America, Inc., 845 Third
Ave., New York, N.Y. 10022.

PURCHASING AGENTS

(D.O.T. 162.158, 180.118,
191.118, and 252.358)

Nature of the Work

If materials, supplies, or equipment are not on hand when needed an organization's work may be interrupted or halted. Maintaining an adequate supply of items a firm needs to operate is the purchasing agent's job.

Purchasing agents and their assistants obtain goods and services of the required quality at the lowest possible cost, and see that adequate supplies are kept on hand. Agents who work for manufacturing firms buy machinery, raw materials, and product components; those working for government agencies may purchase office supplies, furniture, and business machines. ("Buyers" who purchase merchandise for resale in its original form are not included in this statement.)

Purchasing agents buy when stocks on hand reach a predetermined reorder point, or when a department in the organization requisitions items it needs. Because agents usually can purchase from many sources, their main job is selecting the seller who offers the best value.

Purchasing agents use a variety of means to select among suppliers. They compare listings in catalogs and trade journals and telephone suppliers to get information. They also meet with salesmen to examine samples, watch demonstrations of equipment, and discuss items to be

purchased. Sometimes agents invite suppliers to bid on large orders; then they select the lowest bidder among those who meet requirements for quality of the goods and delivery date.

It is important that purchasing agents develop good business relations with their suppliers. This can result in savings on purchases, favorable terms of payment, and quick delivery on rush orders or material in short supply. They also work closely with personnel in various departments of their own organization. For example, they may discuss product specifications with company engineers or shipment problems with workers in the shipping and receiving or traffic departments.

Once an order has been placed with a supplier, the purchasing agent makes periodic checks to insure that it will be delivered on time. This is necessary to prevent work flow interruptions due to lack of materials.

After an order has been received and inspected, the purchasing agent authorizes payment to the shipper.

Because of its importance, purchasing usually is designated as a separate responsibility within a firm. In a large firm, the head of the purchasing department directs the work of a staff which includes assistant purchasing agents and clerical workers. Assistants may purchase certain categories of goods, such as raw materials or office supplies, or specialize in buying specific items—for example, steel, lumber, cotton, or oil.

Places of Employment

About 180,000 persons—90 percent of them men—were purchasing agents in 1972. Nearly half worked in manufacturing industries. Large numbers also were employed by government agencies, construction companies, hospitals, and schools.



Purchasing agents examine sample equipment.

Most purchasing agents work in firms that have fewer than 10 employees in the purchasing department. Some large firms, however, may have a hundred or more specialized buyers.

Training, Other Qualifications, and Advancement

Many large employers seek college graduates for beginning positions as purchasing agents. Although companies that manufacture complex machinery or chemicals may prefer a background in engineering or science, other firms hire business administration or liberal arts majors for trainee jobs. Courses in accounting, economics, and purchasing are helpful. Many small firms prefer experience with the company, and select purchasing workers from among their own personnel, whether or not they have a college education. For advancement to high-level positions, however, a college degree is becoming increasingly important.

Regardless of previous training, the beginning purchasing agent must spend considerable time learning about his company's operations and purchasing procedures. He may be assigned to the storekeeper's section to learn about purchasing forms, inventory records, or storage facilities. Next he may work with an experienced buyer to learn about types of goods purchased, prices, and suppliers.

Following the initial training period, a trainee often becomes a junior buyer of standard catalog items. As he gains experience and exercises good judgment in the various aspects of purchasing, he may be promoted to assistant purchasing agent and then to purchasing agent. Some agents advance to positions as vice presidents of purchasing or procurement officers.

The purchasing agent must be able to analyze numbers and technical data in order to make buying decisions and take responsibility for spending large amounts of company money. The job requires the ability to work independently and a good memory for details. In addition, a purchasing agent must be tactful in dealing with salesmen and able to motivate others.

Employment Outlook

A moderate increase in the employment of purchasing agents is expected through the mid-1980's. In addition to job openings resulting from growth, many opportunities are expected annually because of the need to replace personnel who retire, transfer, or leave the field for other reasons.

Major factors underlying this growth include the continued increase in the size of business and manufacturing firms and the development of new products and sources of supply such as foreign markets. In particular, the ever-in-

creasing complexity and specialization of business functions and products will spur demand for purchasing agents with knowledge in specific areas.

Earnings and Working Conditions

College graduates hired as purchasing trainees in large firms earned from \$7,500 to \$8,500 a year in 1972, according to the limited data available. In the Federal Government, beginning purchasing agents who had college degrees earned \$7,700 or \$9,500 in early 1973, depending on scholastic achievement and performance on the Federal Service Entrance Examination.

In 1972, experienced agents purchasing standard items averaged more than \$10,500; buyers purchasing complex or technical goods averaged more than \$15,000. Some top purchasing executives earned over \$45,000 a year. Purchasing agents earn about one and one-half times as much as the average for all non-supervisory workers in private industry, except farming.

Sources of Additional Information

Further information on education and training is available from:

National Association of Purchasing Management, 11 Park Place, New York, N.Y. 10007.

COMPUTER AND RELATED OCCUPATIONS

Data processing needs have increased very rapidly over the past decade as population has grown, business organizations have become more complex, and scientific and technical knowledge has expanded. The computer has enabled us to keep pace with the increasing need for more and better information. Workers in computer and related occupations prepare data in the form necessary for machine processing, operate computer consoles and various kinds of peripheral equipment, and analyze and interpret the output of computers.

Most computer careers require specialized training that varies widely in content and length depending on the occupation. While there are no universal educational requirements for systems analysts and programmers, a college degree is increasingly important—especially for work in scientifically and technically oriented systems.

All computer jobs stress the importance of learning on the job. While this is the primary source of training for operating personnel, on-the-job learning is also important for college graduates in computer science, who may spend a year or more working on a system to learn how it functions.

In addition to technical knowledge and skills, computer personnel need good powers of concentration and should enjoy working with details. To operate equipment, they must have manual dexterity and some mechanical aptitude. Although programmers and systems analysts seldom run computer equipment, they need mechanical ability to trace the source of data processing errors.

This section describes two computer occupations, programmers and systems analysts.

PROGRAMMERS

(D.O.T. 020.188)

Nature of the Work

An electronic computer can process masses of information with great speed and accuracy, but the machine cannot think for itself. The programmer's job is to prepare step-by-step instructions for the computer to follow.

Before a computer can process a problem, exact and logical steps for its solution must be worked out. An experienced programmer or systems analyst does this preliminary work. (See the statement on Systems Analysts elsewhere in the *Handbook*.) Some programmers, whose work involves a considerable amount of this preliminary analysis, are known as programmer-analysts.

When this preliminary job is finished, the programmer prepares detailed instructions that tell the machine how to process the data. The way a "program" is written depends on the nature of the problem and the type of equipment to be used. The mathematical calculations involved in billing a firm's customers, for example, are different from those required in most scientific work. A business programmer works on instructions that tell the computer how to bill customers or make up a payroll. First the programmer decides what company records contain the information needed to prepare the documents. Next he makes a flow

chart or diagram showing the computer what order to follow in doing each step. From the flow chart, the programmer writes detailed instructions telling the machine exactly what to do with each piece of information. He also prepares an instruction sheet for a computer operator to follow when the program is run. (The work of computer operators is described in the *Handbook* statement on Computer Operating Personnel.)

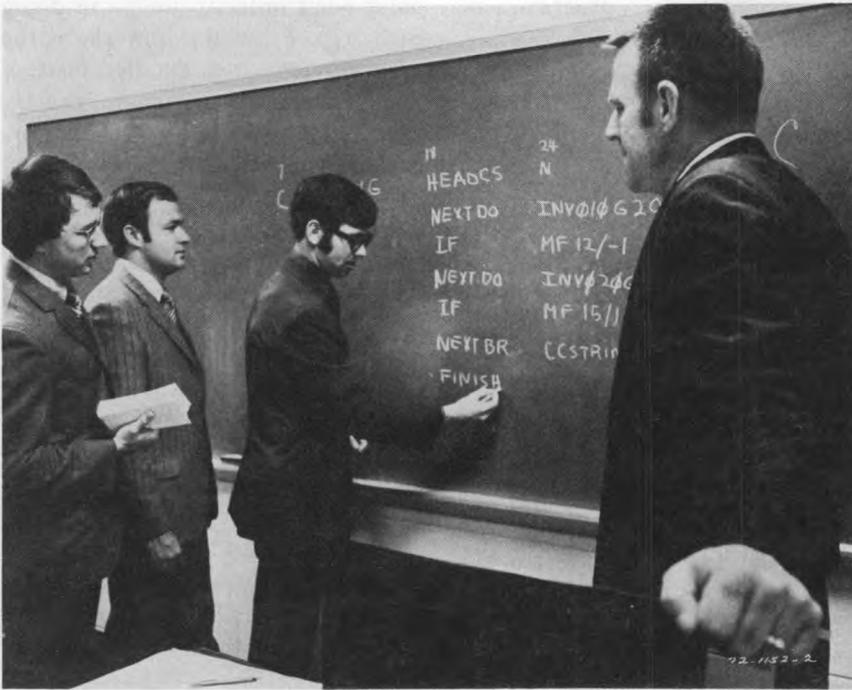
The final step in programming is a check to be sure that the programmer's instructions are correct and will produce the desired information. This check is called "debugging." The programmer uses a sample of the data to be processed to review what will happen as the computer follows instructions. He changes the instructions to take care of any errors that appear and has the computer make a trial run.

Because of differences in their work, many programmers specialize in either business or scientific applications. Some, known as systems or software programmers, write instructions that tell the computer how to schedule jobs and when to switch from one to another. Although a simple program can be written in a few days, one designed to produce many different kinds of information may require a year or more. Often several programmers at different levels of responsibility work together under an experienced programmer's supervision.

Places of Employment

About 186,000 persons—about three-fourths of them men—worked as programmers in 1972. In addition, some professional workers such as engineers, economists, and accountants spend part of their time programming.

Most programmers work in large business organizations and govern-



Programmer explains instructions for processing data.

ment agencies. Large numbers also work for computer and other manufacturers and independent service organizations that furnish computer services for a fee.

Training, Other Qualifications, and Advancement

There are no universal training requirements for programmers. Some are college graduates; others take special courses in computer work to supplement experience in a field such as accounting or inventory control.

Organizations that use computers for science and engineering prefer college graduates with degrees in the physical sciences, math, engineering, or computer science. Graduate degrees are required for some jobs. Very few scientific employers are interested in an applicant with no college training.

Many employers who use computers to process business records don't require college degrees, although college courses in data processing, accounting, and business administration are helpful. Some workers with no college training but experience in machine tabulation or payroll are promoted to programming jobs. They usually need additional courses in data processing before they are fully qualified programmers.

Interested persons can learn some of the necessary programming skills at a growing number of technical schools, colleges, and universities. Instruction ranges from introductory home study courses to advanced computer technology at the graduate level. High schools in many parts of the country also offer courses in computer programming.

In hiring programmers, employers look for people who have an apti-

tude for logical thinking and exacting analysis. The job also calls for patience, persistence, and the ability to work with extreme accuracy. Ingenuity and imagination are particularly important when programmers have to solve problems in new ways.

Beginning programmers usually attend training classes for a few weeks. Then they work on simple assignments while continuing with further specialized training. A programmer generally needs a year or more of experience before he can handle all aspects of his job without close supervision. Once he becomes skilled, his prospects for further advancement are good. In large organizations, workers may be promoted to lead programmers or systems analysts with supervisory responsibilities.

Employment Outlook

The employment of programmers will grow rapidly over the next decade as the number of computer installations increases. Thousands of job openings will become available each year due to growth and the need to replace workers who leave the occupation. Because many programmers are young, relatively few job openings will be due to death or retirement.

The number of programmers will increase as business continues to automate processes once done by hand. For example, many stores will computerize credit information and their ordering and inventory of merchandise. Employment growth also will be sharp in computer service bureaus (organizations that furnish computer services for a fee). Substantial growth will continue in firms that were among the first to use computers on a large scale, including banks, insurance companies, and factories.

Although employment growth will be significant, programmers are not expected to multiply as rapidly as they have in the past for several reasons. Improved programming languages should make it easier for nonprogrammers to use machines, and preprogrammed mini-computers will be used for many applications. In addition, new techniques will enable the programmers to handle a greater volume of work. The best opportunities will be for experienced persons qualified in both programming and systems analysis who have kept up with the latest equipment and techniques.

Earnings and Working Conditions

Beginning business programmers averaged \$8,500 a year in 1972, according to a Bureau of Labor Statistics survey in urban areas. Those in the North and West earned slightly more than the average while workers in the South earned a little less. Also programmers who worked for manufacturers and public utilities had higher earnings than those employed by banks and insurance companies.

Experienced business programmers averaged \$11,000 a year, nearly twice as much as average earnings for all nonsupervisory workers in private industry, except farming. Lead programmers averaged \$14,400 and managers of programming, \$16,700 a year.

Federal government salaries are close to those in private industry. In early 1973, beginners started at \$7,700 or \$9,500; most experienced programmers earned from \$11,600 to \$18,900 a year.

Programmers work about 40 hours a week, but their hours are not always from 9 to 5. Once or twice a week a programmer may report ear-

ly or work late to use the computer when it is available. Occasionally, they work on weekends or are telephoned to advise computer operators working a second or third shift.

Sources of Additional Information

Additional details about the occupation of programmer are available from:

Data Processing Management Association, 505 Busse Highway, Park Ridge, Ill. 60068.

American Federation of Information Processing Societies, 210 Summit Ave., Montvale, N.J. 07645.

For a list of reading materials on career opportunities in programming contact:

Association for Computing Machinery, 1133 Avenue of the Americas, New York, N.Y. 10036.

SYSTEMS ANALYSTS

(D.O.T. 003.187, 012.168, 020.081 and 020.088)

Nature of the Work

Many essential business functions and scientific procedures rely on the work of systems analysts. Their job is to plan the activities needed for processing data to solve business, scientific, or engineering problems. Although a system can be developed to process data by hand, with office machines, or by computers, most analysts develop methods to use computers. This statement applies only to analysts who work on systems that use computers.

Systems analysts begin an assign-

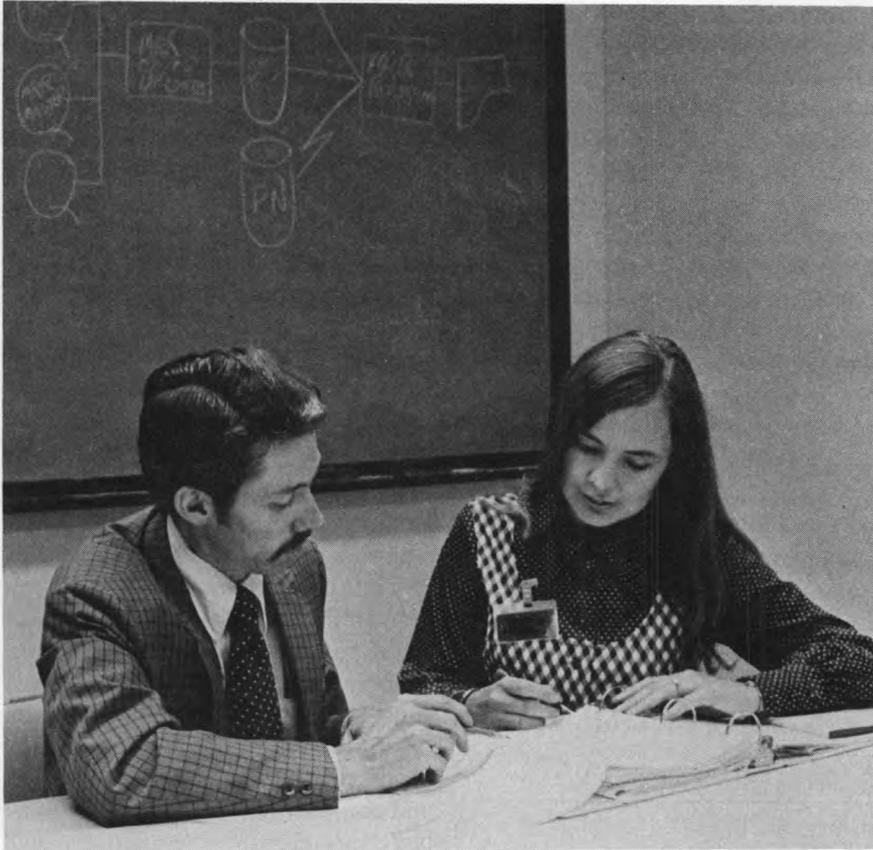
ment by determining the exact nature of the data processing problem. Often managers or subject matter specialists help them to do this. Then the analyst structures the problem logically, identifies all the data needed, and specifies how they are to be processed. Systems analysts may use various techniques in their work such as cost accounting, sampling, and mathematical model building. After analyzing the problem and devising a data processing system, they prepare charts and diagrams that describe how the system operates.

Analysts usually recommend which data processing equipment is to be used, and prepare instructions for programmers. (See the statement on Programmers in this chapter.) They also translate final results into terms that managers or customers can understand. Data processing problems are so varied and complex that many systems analysts specialize in one area. For example, analysts who work for scientific or engineering organizations may develop systems to determine the flight path of a space vehicle. Others develop business systems for functions such as accounting, forecasting sales, or marketing research.

Some analysts improve systems already in use. They may develop better procedures or adapt the system to handle additional or different types of data. Others do research, described as advanced systems design, to devise new methods of systems analysis. These analysts usually have mathematical or engineering backgrounds.

Places of Employment

More than 100,000 persons—about 90 percent of them men—worked as systems analysts in 1972. Most analysts worked in urban



Systems analyst confers with programmer.

areas for manufacturing concerns, insurance companies, banks, and wholesale and retail businesses. A growing number also are employed by universities and independent organizations that furnish computer services for a fee.

Training, Other Qualifications, and Advancement

There is no universally acceptable way of preparing for work in systems analysis. Some employers prefer applicants who have a bachelor's degree and experience in mathematics, science, engineering, accounting, or business. Others stress a graduate degree.

Educational preparation and experience often determine the kind of

job opportunities available. For example, employers usually want an analyst who has a background in business administration for work in finance or one having an engineering background for a scientifically oriented system. Applicants also may qualify on the basis of professional experience in scientific, technical, or managerial occupations, or practical experience in data processing jobs such as programmer or computer operator. (See the statement on Computer Operators in this chapter.)

Most employers prefer people who have had some experience in computer programming. A beginner can learn to use electronic data-processing equipment on the job, or can take special courses offered by his employer, computer manufacturers,

or colleges. In the Federal Government, for example, systems analysts usually begin their careers as programmers. After gaining some experience, they may be promoted to systems analyst trainees, and thus later qualify as systems analysts.

Systems analysts need an aptitude for logical thinking and should like working with ideas. Although they sometimes work as part of a team, much of their work is done independently. They should be able to concentrate and pay close attention to details.

In large data-processing departments, a person who begins as a junior systems analyst and gains experience may be promoted to senior or lead systems analyst. Systems analysts who show leadership ability also can advance to jobs as managers of systems analysis or data-processing departments.

Employment Outlook

Employment of systems analysts is expected to grow very rapidly through the mid-1980's as data processing systems in business and Government expand. In addition to opportunities that result from growth, some openings will occur as systems analysts advance to more responsible positions or leave their jobs to enter other employment. Because many of these workers are young, relatively few positions will result from retirement or death.

Among the factors expected to contribute to a growing demand for systems analysts are the extension of computer technology to small businesses and the growth of computer centers to serve individual clients for a fee. Employment also will be stimulated by efforts to develop systems that will retrieve information more efficiently, and to monitor industrial processes.

Earnings and Working Conditions

Beginning systems analysts averaged \$11,800 a year in 1972, according to a private survey which covered more than 85,000 workers in business and government data-processing installations in all parts of the country. Earnings of experienced systems analysts averaged \$15,700 annually; in some cases they were paid \$25,000 or more a year. Systems analysts earn over twice as much as the average for all non-supervisory workers in private industry, except farming.

Systems analysts usually work about 40 hours a week—the same as other professional and office workers. Unlike many computer operators who work evening or night shifts, systems analysts generally work only during the day. Occasionally, evening or weekend work may be necessary to complete emergency projects.

Sources of Additional Information

Additional information about the occupation of systems analyst is available from:

American Federation of Information Processing Societies, 210 Summit Avenue, Montvale, N.J. 07645.

Data Processing Management Association, 505 Busse Highway, Park Ridge, Ill. 60068.

For a list of reading materials on career opportunities in the data processing field write:

Association for Computing Machinery, 1133 Avenue of the Americas, New York, N.Y. 10036.

INSURANCE OCCUPATIONS

Insurance protection has become an integral part of the American way of life. It frees policyholders and their beneficiaries from worry about the financial burdens that may result from death, illness, or other losses beyond their control. Businesses could not operate, nor could most people buy homes or other major items, without the assurance of protection from sudden disaster. Insurance workers adapt policies to meet changing needs, decide which applications can be accepted, establish premium rates on the policies, and investigate and settle claims.

A college degree is increasingly important for professional, technical, and managerial jobs in insurance, although some positions are open to high school graduates who have appropriate experience. Regardless of their previous training, insurance workers must continually learn while on the job to develop their potential. Many professional associations sponsor courses in all phases of insurance work; employees are encouraged to participate to prepare themselves for more responsible jobs.

This section describes four insurance occupations: actuaries, claim adjusters, claim examiners, and underwriters.

ACTUARIES

(D.O.T. 020.188)

Nature of the Work

Why do young persons pay more for automobile insurance than older persons? How much should an insurance policy cost? Answers to these and similar questions are provided by actuaries who design insurance and pension plans that can be maintained on a sound financial basis. They assemble and analyze statistics to calculate probabilities of death, sickness, injury, disability, unemployment, retirement, and property loss from accident, theft, fire, and other potential hazards. Actuaries use this information to determine the expected insured loss. For example, they may calculate how many persons who are 21 years old today will live to age 65—the possibility that an insured person might die during this period is a risk to the company. They then calculate a price for assuming this risk that will be profitable to the company yet be competitive with other insurance companies. Finally, they must make sure that the price charged for the insurance will enable the company to pay all claims and expenses as they occur. In the same manner, the actuary calculates premium rates and policy contract provisions for each type of insurance offered. Most actuaries specialize in either life and health insurance or in property and liability (casualty) insurance.

To perform their duties effectively, actuaries must keep informed about general economic and social trends, and legislative, health, and other developments that may affect insurance practices. Because of their broad knowledge of insurance, actuaries may work on problems arising in investment, underwriting, group insurance, and pension sales

and service departments. Actuaries in executive positions help determine general company policy. In that role, they explain complex technical matters to a variety of laymen, company executives, and government officials. They also may testify before public agencies on proposed legislation affecting the insurance business, or justify intended changes in premium rates or contract provisions.

Actuaries who work for the Federal Government usually deal with a particular insurance or pension program, such as social security or life insurance for veterans and members of the Armed Forces. Actuaries in State government positions regulate insurance companies, supervise the operations of State retirement or pension systems, and work on problems connected with unemployment insurance or workmen's compensation. Consulting actuaries set up pension and welfare plans and make periodic evaluations of these plans for private companies, unions, and government agencies.

Places of Employment

Approximately 5,500 persons worked as actuaries in 1972. About one-half of all actuaries worked in the three states that are the major centers of the insurance industry — New York, Connecticut, and Illinois.

Over two-thirds of all actuaries worked for private insurance companies. Most worked for life insurance companies; the rest worked for property and liability (casualty) companies. The number of actuaries employed by an insurance company depends on the volume of its business and the number and types of insurance policies it offers. Large companies may employ over 100 actuaries; small firms may have only a few actuaries on their staffs or rely



Actuaries receive on-the-job training.

instead on rating bureaus or consulting firms.

Consulting firms and rating bureaus (associations that supply actuarial data to member companies) employed about one-fifth of all actuaries. Other actuaries work for private organizations administering independent pension and welfare plans or for Federal and State government agencies. A few teach in colleges and universities.

Training, Other Qualifications, and Advancement

The minimum requirement for

beginning jobs in actuarial work is a bachelor's degree with a major in mathematics, statistics, economics, or business administration and a thorough foundation in calculus, probability, and statistics. Other desirable courses are insurance law, economics, and accounting. Although only 17 colleges and universities offer training specifically designed for actuarial careers, several hundred schools offer some of the necessary courses.

It usually takes from 5 to 10 years after beginning an actuarial career to complete the entire series of examinations required for full

professional status. These examinations cover general mathematics, specialized actuarial mathematics, and all phases of the insurance business. Those considering an actuarial career should take at least the beginning examination covering general mathematics while still in college. Success in passing the first two examinations helps beginners to evaluate their potential as actuaries. Those who pass these examinations usually have better opportunities for employment and receive a higher starting salary. Advanced examinations, usually taken by those in junior actuarial positions, require extensive home study and experience in insurance work.

The Society of Actuaries gives 10 actuarial examinations for the life insurance and pension field; and the Casualty Actuarial Society gives 9 for the property and liability (casualty) field. Since the first parts of the examination series of either Society are the same, students may defer the selection of their insurance specialty until they become more familiar with the field. Persons who complete five examinations in either field are awarded "associate" membership in the society. Those who have passed an entire series receive the title "fellow".

Beginning actuaries often rotate among different jobs to learn various actuarial operations and to become familiar with different phases of insurance work. At first, their work may be rather routine, such as preparing calculations or tabulation for actuarial tables or reports. As they gain experience, they may supervise actuarial clerks, prepare correspondence and reports, and do research.

Advancement to more responsible work as assistant, associate, and chief actuary depends largely on job performance and the number of actuarial examinations passed. Many

actuaries, because of their broad knowledge of insurance and related fields, are selected for administrative positions in other company activities, particularly in underwriting, accounting, or data processing departments. Some actuaries advance to top executive positions.

New State and Federal legislation, such as no-fault automobile insurance, competitive rating, and pension reform may be passed, and make more actuarial studies necessary.

Casualty Actuarial Society, 200 East 42nd St., New York, N.Y. 10017

Society of Actuaries, 208 South LaSalle St., Chicago, Ill. 60604.

Employment Outlook

Employment of actuaries is expected to rise very rapidly through the mid-1980's. In addition to job openings resulting from this growth, several hundred actuaries will be needed each year to replace those who retire, die, or transfer to other occupations. Job opportunities should be favorable for new college graduates who have passed one or two of the actuarial examinations while still in school and have a strong mathematical and statistical background. However, because of the large number of persons expected to receive degrees in mathematics, and the increasing number of students taking actuarial examinations, competition for beginning jobs could intensify.

A more affluent and insurance-conscious population and business community will demand a rising number and variety of insurance policies. There will be a need for actuaries to solve the growing number of problems arising from continuously rising, and increasingly complex insurance and pension coverage. The growing number of group health and life insurance plans and of pension and other benefit plans will require actuarial services. Government regulatory agencies will need additional actuaries. The wide-spread use of electronic computers has also made more actuarial studies possible, and there will be a need for actuaries capable of working with electronic computers.

Earnings and Working Conditions

In 1972, actuaries had average salaries over three times as high as the average for non-supervisory workers in private industry, except farming. Depending on their college grades and experience, new college graduates entering the field as trainees earned from about \$8,000 to \$10,000 a year. Most insurance companies paid \$300 to \$800 a year more to trainees who had completed their first actuarial examination, and another \$300 to \$800 when they completed the second examination.

In the Federal government, new graduates with the bachelor's degree could start at \$7,694 or \$9,520 a year in early 1973, depending on their college grades. Those with the master's degree could start at \$9,520 or \$11,614.

Beginning actuaries can look forward to a marked increase in earnings as they gain professional experience and successfully complete either society's series of examinations. Insurance companies give merit increases to those who pass one or a group of examinations. Fellows of either the Society of Actuaries or the Casualty Actuarial Society earn over \$18,000 a year and many actuaries earn more than \$25,000 a year. Those in executive positions in large companies may earn over \$35,000.

Sources of Additional Information

For facts about actuarial opportunities and qualifications contact:

CLAIM ADJUSTERS

(D.O.T. 191.268, 241.168)

Claim adjusters investigate, negotiate, and settle claims made against an insurance company by policyholders who have suffered loss. Most adjusters work for companies that sell property and liability insurance, although some handle claims arising under accident or health insurance policies. (See the statement on Claim Examiners for a discussion of claim settlement in life insurance.)

When an insurance company receives a claim, the adjuster determines the amount of the loss and whether the policy covers it. Adjusters use reports, physical evidence, and testimony of witnesses in investigating a claim. When their company is liable, they negotiate with the claimant and settle the case.

Adjusters make sure that settlements are in line with the real extent of the loss. They must protect their company from false or inflated claims but, at the same time, settle valid claims fairly and promptly. Some adjusters are allowed to issue checks on company funds; others submit their findings to the insurance company which then pays the claimant.

Some adjusters work with all lines of insurance. Others specialize in claims from property damage by fire, marine losses, automobile damage, workmen's compensation losses, or bodily injury. Some States have no-fault insurance plans that

relieve the adjuster from determining responsibility for a loss. Adjusters who work in these States, however, still must decide the true amount of a loss. For some minor property damage cases, the insured parties submit estimates of repair costs. For other claims, adjusters personally inspect the damage and make a brief investigation.

Adjusters work mostly away from the office. They may be called to the site of an accident or to the location of a fire or burglary. Adjusters make their own schedules of the activities needed to dispose of a claim properly. They also keep written or taped records of information obtained from witnesses and other sources, and prepare reports of their findings.

Places of Employment

About 128,000 persons—most of them men—were claim adjusters in 1972. Adjusters work for insurance companies, adjustment bureaus (organizations formed by several insurance companies to settle claims), and independent adjusting firms.

Some contract their services privately for a fee.

A few public adjusters represent the insured rather than the insurance company. These adjusters usually are retained by banks, financial organizations, and other business firms to handle fire and other losses to property. They negotiate claims against insurance companies and deal with adjusters for such companies.

Adjusters can look forward to working in almost any area of the United States, since claims must be settled locally in all parts of the country. Occasionally, the adjuster may travel to the scene of a disaster, such as a hurricane or a riot, to work with local personnel. Some cases result in travel outside the United States.

Training, Other Qualifications, and Advancement

Although a growing number of firms require claim adjusters to have a college degree, many hire those without college training, partic-

ularly if they have specialized experience. For example, a person experienced in automobile repair work may qualify as an auto adjuster. However, an adjuster who lacks college training probably will be slower in advancing to senior or supervisory positions.

No specific field of college study is recommended; many successful adjusters have liberal arts backgrounds. An adjuster who has a business or accounting background might specialize in loss from business interruption or damage to merchandise. Those with college training in engineering or law will find their education helpful in adjusting bodily injury claims. Legal training is desirable, although few employers demand that beginning adjusters have a law degree.

Nearly three-fourths of the States and Puerto Rico require adjusters to be licensed. Despite wide variation among State licensing requirements, applicants usually must comply with one or more of the following: pass a written examination covering the fundamentals of adjusting; furnish character references; be 20 or 21 years of age and fulfill State residency qualifications; offer proof that they have completed an approved course in insurance or loss adjusting; and file a surety bond.

Many insurance companies and adjustment firms offer on-the-job training and home study courses for beginning adjusters. The Insurance Institute of America offers a six-semester study program leading to a diploma in insurance loss and claim adjusting upon successful completion of six examinations. Adjusters can prepare for these examinations by independent home study, through company or public classes, or by college courses in insurance. A professional Certificate in Insurance Adjusting also is available from the College of Insurance in New York City.



Claim adjuster discusses automobile damage with a policyholder.

Because they work closely with claimants, witnesses, and policyholders, adjusters must be able to adapt to many different persons and situations. They should be able to gain the respect and cooperation of people from different backgrounds. When an adjuster's evaluation of a claim differs from that of the person who has suffered the loss, he should be able to explain his conclusions tactfully. Successful adjusters must be observant and pay careful attention to details.

Most adjuster trainees are assigned to field offices or urban training centers operated by some insurance companies for an orientation course in general insurance principles. Beginners work on small claims under the supervision of an experienced adjuster. As they learn more about claim investigation and settlement, they are assigned claims that are higher in loss value and more difficult.

Adjusters may be promoted to senior or chief adjuster when they demonstrate competence in handling assignments and progress in available study courses. The adjuster who shows administrative skills may advance to claim supervisor in a field office; senior adjusters who are able to organize workflow and make decisions may be promoted to managerial positions in the field or home office. Adjusters with legal backgrounds can advance to trial attorney or home office legal manager.

Employment Outlook

Employment of claim adjusters is expected to grow moderately through the mid-1980's as the number of insurance claims continues to increase. In addition to jobs created by growth of the occupation, many others will result from the need to replace workers who die, retire, or transfer to other jobs.

Several factors point to a growing volume of insurance and a resulting need for claim adjusters. Higher personal incomes should stimulate property and liability sales as families insure homes, additional automobiles, and other consumer durables. Expanding businesses will need protection for new plants and equipment and for insurance covering workmen's compensation and product liability. As more people live and work in densely populated areas, the increased risk of automobile accident, fire, or theft should result in a greater number of claims.

Growth of this occupation may be slower than in recent years as no-fault plans enable adjusters to handle more cases. Independent adjusters who specialize in automobile damage claims may suffer some loss of business. Prospects are best for adjusters who specialize in other types of claims or those who can move into other lines of adjusting.

Earnings and Working Conditions

According to an American Insurance Association/American Mutual Insurance Alliance survey of companies that sell property and liability insurance, all-lines adjusters averaged \$10,000 a year in 1972.

Adjusters with supervisory responsibilities averaged \$13,000; some earned over \$20,000 a year. Most public adjusters are paid a percentage of the amount of the loss adjustment—generally 10 percent. Adjusters may be furnished company cars or reimbursed for use of their own vehicles during business hours. Salaries of claim adjusters are above the average earnings for nonsupervisory workers in private industry, except farming.

Claim adjusting is not a desk job. It requires that a person be physically fit because much of the day

may be spent in driving from one place to another, walking about outdoors, and climbing stairs. Adjusters may have to work evenings or weekends in order to interview witnesses and claimants when they are available. Since most companies provide 24-hour claim service to their policyholders, some adjusters always must be on call. (See the statement on the Insurance Industry for additional information on working conditions and employee benefits.)

Sources of Additional Information

Information about licensing requirements for claim adjusters may be obtained from the department of insurance in each State. General information about a career as a claim adjuster is available from the home offices of many property and liability insurance companies. Information about career opportunities as a claim adjuster also may be obtained from:

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

Information about public insurance adjusting is available from:

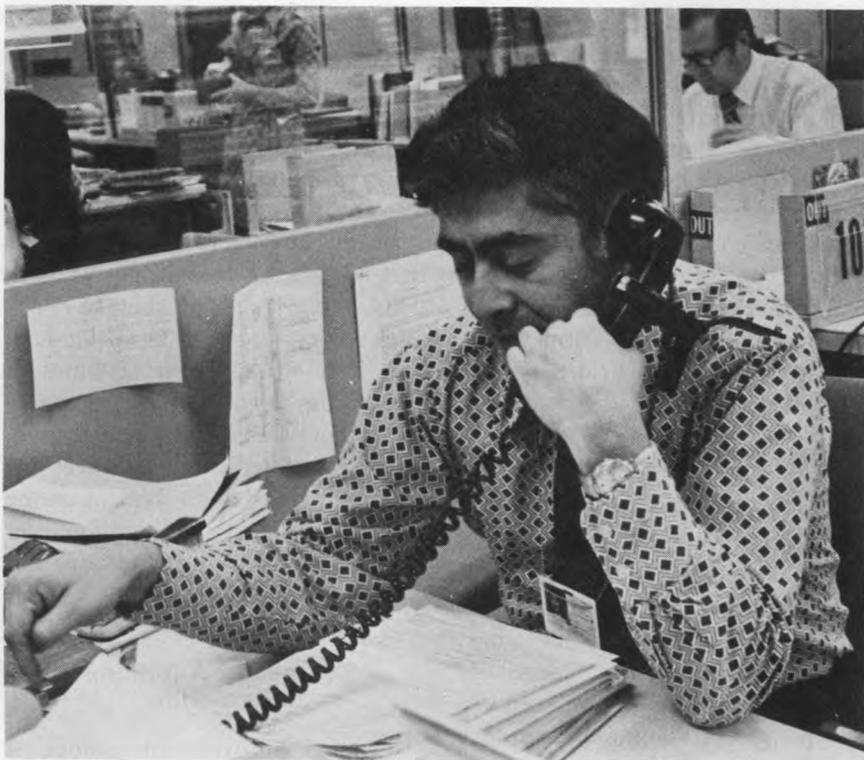
National Association of public Adjusters, 1613 Munsey Building Baltimore, MD. 21202.

CLAIM EXAMINERS

(D.O.T. 168.288 and 249.268)

Nature of the Work

Although policyholders expect their insurance claims to be paid promptly, important questions often must be answered first. These questions may arise when large settlements are made by property/liability company adjusters, when



Examiner discusses insurance claims with policyholder.

a false claim is suspected, or as regular procedure when a claim exceeds a specified amount. Claim examiners, also called claim representatives or claim reviewers, investigate details of the claim to provide answers for these questions.

Life insurance claim examiners may check claim applications for completeness and accuracy, interview medical specialists, consult policy files to verify information on a claim, or calculate benefit payments. They are authorized to investigate and approve payment on all claims up to a certain limit; larger claims are referred to a senior examiner.

In property/liability companies, the claim examiner reviews claims to be sure that the adjusters, who do most of the investigative work, have followed proper procedures. (See the statement on Claim Adjusters elsewhere in the *Handbook*.) Some

property/liability firms employ workers to examine and settle small claims only, such as those arising over minor automobile damage. These claim workers, called "inside adjusters," contact claimants by telephone or mail and have the policyholder send repair costs, medical bills, and other statements to the company.

In both life and property/liability companies, some home office examiners process only unusual or questionable claims referred from regional or field offices.

Claim examiners need a thorough knowledge of their company's settlement procedures and basic policy provisions. Although they can consult company claim manuals, efficient examiners must be familiar with procedures so that frequent checking is unnecessary. Besides verifying claims and approving pay-

ment, claim examiners maintain records and prepare reports to be submitted to their company's data processing department.

Examiners checking incorrect or questionable claims may correspond with investigating companies, field managers, agents, and policyholders. Claim examiners occasionally travel to obtain information by a personal interview, or contact State insurance departments and other insurance companies. Experienced examiners serve on committees, conduct surveys of claim practices within their company, and help devise more efficient ways to process claims. They also may appear in court to testify on contested claims.

Places of Employment

About 29,000 persons—half of them women—worked as claim examiners in 1972. Most worked for life insurance companies in large cities such as New York, Hartford, Chicago, San Francisco, and Dallas, where home or regional offices are located. Some were employed in field offices in smaller cities and towns where their companies sell and service insurance policies.

Training, Other Qualifications, and Advancement

Although many employers prefer college graduates for claim examiner positions, some firms accept applicants with good high school records if they have experience in clerical work or some college training. The employee who has only a high school education may begin as a claim processor in a group life or health insurance department. College graduates, or those having 2 years or more of college training, usually begin work as junior claim ex-

aminers. Although courses in insurance, economics, or other business subjects are helpful, a major in almost any college field is adequate preparation.

The beginning claim examiner is given on-the-job training under the direction of an experienced claim manager. Trainees who are college graduates also may receive instruction in insurance fundamentals or personnel management designed to prepare them for more responsible jobs. The Life Office Management Association (LOMA) cooperates with the International Claim Association in offering a claims education program for life and health insurance claim examiners. The program is part of the LOMA Institute Insurance Education Program leading to the professional designation of FLMI (Fellow, Life Management Institute) upon successful completion of eight written examinations. Most insurance companies encourage study by making educational materials available to employees enrolled in the LOMA Institute Program. Many firms offer classroom instruction in preparation for the annual examinations.

Because they have frequent contact with agents and brokers, field managers, and policyholders, claim examiners must be able to communicate effectively in many different situations. In addition, they need to be familiar with medical and legal terms and practices and Federal and State insurance laws and regulations. Because the claim examiner may have to check premium payments, policy values, and other numerical items in processing a claim, some skill in performing mathematical calculations is an asset. They also should have a good memory and enjoy working with details.

College trained workers usually

can be promoted to claim examiner or senior claim representative after one year; workers who lack formal academic training generally advance more slowly. Examiners who show unusual competence in claim work sometimes are promoted to claim approver or another supervisory job within the claim department. Qualified examiners also can advance to jobs in underwriting, data processing, or administration.

Employment Outlook

Employment of claim examiners is not expected to increase through the mid-1980's. Some job openings will occur, however, as examiners die, retire, or transfer to other work. Competition for the few supervisory openings is expected to be keen.

Although the volume of insurance should continue to expand, computers will enable each examiner to process more claims, especially routine ones and those that arise under group life and health policies. In addition, as smaller branch offices are consolidated, companies will be able to handle the rapidly expanding volume of claims with a relatively stable work force.

Earnings and Working Conditions

College graduates hired by life insurance companies as claim examiner trainees averaged \$8,000 a year in 1972, according to a Life Office Management Association survey. Supervisors of claims earned \$11,500 to \$17,300 a year. In most cases, examiners in large companies earned higher salaries.

An American Insurance Association/American Mutual Insurance Alliance survey of property/liability insurance companies showed that in 1972 "inside adjusters" averaged \$7,500. Claim

supervisors averaged \$13,000; some earned over \$20,000 a year. Salaries of claim examiners who are not supervisors are slightly above the average for all nonsupervisory workers in private industry, except farming.

Claim examiners have desk jobs that require no unusual physical activity. Although the average work week for examiners is 35 to 40 hours, they may work longer at times of peak claim load or when quarterly and annual statements are prepared. They also may need to travel occasionally. (See the statement on the Insurance Industry for additional information on working conditions and employee benefits.)

Sources of Additional Information

General information about a career as a claim examiner is available from the home office of many life insurance and property/liability insurance companies and also from:

Institute of Life Insurance, 277 Park Ave., New York, N.Y. 10017.

Insurance Information Institute 110 William St., New York, N.Y. 10038.

UNDERWRITERS

(D.O.T. 169.188)

Nature of the Work

Insurance companies assume millions of dollars in risks each year, by transferring chance of loss from their policyholders to themselves. Underwriters appraise and select the risks their company will insure. (The term underwriter sometimes is used in referring to insurance salespeople; see the statement on Insurance Agents and Brokers elsewhere in the

Handbook for a discussion of that occupation.)

An underwriter decides if his company will select a risk after analyzing information in insurance applications, reports of safety engineers, and actuarial studies (reports that describe the probability of insured loss). Some routine applications that require very little independent judgment are handled by computers. Generally, however, underwriters use considerable personal judgment in making decisions. Because these decisions are seldom reviewed at a higher level, the underwriter has great responsibility. His company may lose business to competitors if he appraises risks too conservatively or have to pay many future claims if his underwriting actions are too liberal.

When deciding that a policy is an acceptable risk, an underwriter may outline the terms of the contract, including the amount of the premium. Underwriters frequently correspond with policyholders, agents, and management about policy cancellations or information requests. In addition, they sometimes accompany salespeople on appointments with prospective customers. Some underwriters in small companies issue policies or supervise the sales force.

Most underwriters specialize in one of three major categories of insurance: life, property and liability, or health. Life underwriters may further specialize in one or more types of life insurance, such as group or individual policies. The property and liability underwriter specializes by type of risk insured, such as fire, automobile, marine, or workmen's compensation. Some underwriters, called commercial account underwriters, handle business insurance exclusively. They must evaluate a firm's entire operation in appraising its insurance application.



Underwriter discusses information on an insurance application.

A group insurance policy insures all persons in a specified group through a single contract. The group underwriter analyzes the overall composition of the group to be sure that total risk is not excessive. The duties of some group underwriters are similar to those of insurance salespeople, and include meeting with union or employer representatives to discuss the types of policies available to their groups.

Places of Employment

About 60,000 persons—most of them men—worked as insurance underwriters in 1972. Nearly three-fourths were property and liability underwriters working in field or home offices throughout the United States; most life insurance underwriters are in home offices in a few large cities, such as Hartford, New York City, Chicago, Dallas, and San Francisco.

Training, Other Qualifications, and Advancement

For beginning underwriting jobs,

most insurance companies seek college graduates who have degrees in liberal arts or business administration, but a major in almost any field provides a good general background. Some high school graduates who begin as underwriting clerks may be trained as underwriters after they demonstrate an aptitude for the work.

College graduates usually start as trainees or junior underwriters. They study claim files to learn the factors associated with certain types of losses and carry out their work assignments under an experienced risk appraiser. Many supplement on-the-job training with courses and instruction at home office schools or local colleges and universities. Many firms pay tuition and the cost of books for those who satisfactorily complete underwriting courses. Some companies offer salary increases as an incentive. Several independent study programs are available through associations such as the American Institute for Property and Liability Underwriters, the American College for Life Underwriters, the Home Office Life Underwriters

Association and the Institute of Home Office Underwriters, and the Life Office Management Association.

Underwriting can be a satisfying career for a young man or woman who likes working with details and enjoys relating and evaluating facts. In addition to analyzing problems, underwriters must make prompt decisions and be able to communicate their ideas to others. They also must be imaginative and aggressive, especially when they have to get additional information from outside sources.

Experienced underwriters who complete study courses may advance to chief underwriter or underwriting manager. Some underwriting managers are promoted to senior managerial jobs after several years.

Employment Outlook

The employment of underwriters is expected to grow moderately through the mid-1980's as insurance sales continue to expand. Each year many jobs will become available as the occupation grows and as those who die, retire, or transfer to other work are replaced.

Several factors underlie the expected growth in the volume of insurance and the resulting need for underwriters. Higher personal incomes should stimulate purchases of life insurance, especially policies which provide retirement income and money for children's education. Property and liability insurance sales should expand as purchases of auto-

mobiles, pleasure boats, and other consumer durables increase. Both spending for new home construction and the American public's growing security consciousness should contribute to demand for more extensive insurance protection. Expanding businesses will need protection for new plants and equipment and insurance for workmen's compensation and product liability. Heightened competition among insurance companies and changes in regulations affecting investment profits also are expected to increase the insurance industry's need for competent underwriters.

Earnings and Working Conditions

College graduates hired as underwriter trainees averaged \$8,140 a year in 1972, according to a Life Office Management Association (LOMA) survey of 55 U.S. companies. Senior underwriters (those with 5 years' experience) earned \$10,000 to \$15,000 in 1972; supervisors of underwriting in life insurance companies averaged \$13,000 to \$20,000. In most cases, underwriters in larger companies earned higher salaries. Salary ranges also were higher in the Eastern and Central states, slightly lower in the West, and substantially lower in the South.

An American Insurance Association/American Mutual Insurance Alliance survey of companies that sell property and liability insurance showed that experienced underwriters averaged \$10,000 a year in

1972. Earnings varied by underwriting specialty; ocean marine underwriters earned the highest and personal line underwriters the lowest annual salaries. Experienced underwriters earn nearly twice the average earnings of nonsupervisory workers in private industry, except farming. Underwriting supervisors in property and liability companies averaged \$13,400 a year in 1972; many earned over \$16,000.

Most underwriters have desk jobs that require no unusual physical activity. Although the average week is 35 to 40 hours, underwriters sometimes work overtime. Most insurance companies have liberal vacation policies and other employee benefits. (See the statement on the Insurance Industry for additional information on working conditions and employee benefits.)

Sources of Additional Information

General information about a career as an insurance underwriter is available from the home offices of many life insurance and property and liability insurance companies. Information about career opportunities as an underwriter also may be obtained from:

Institute of Life Insurance, 277 Park Ave., New York, N.Y. 10017.

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

American Mutual Insurance Alliance, 20 North Wacker Dr., Chicago, Ill. 60606.

SERVICE OCCUPATIONS

Workers in service occupations police streets, serve food, put out fires, clean homes and buildings, and provide services to the American people in many other ways. In 1972 approximately 11 million service workers were employed in a wide range of occupations that included babysitters, police officers, cooks, hospital attendants, theater ushers, barbers, and building custodians. College graduates are increasingly being employed in the protective and related service occupations.

The growth of the Nation's population and economy demands an ever-increasing emphasis on protective services. Each city, suburban area, and national port of entry requires protective and related service workers to check crime, minimize loss of life and property, and enforce regulations that protect the health and safety of our citizens. More than 1 million people, or about one-tenth of all service workers, were in protective service occupations in 1972.

Careers in protective and related service occupations require varied combinations of education and experience. Workers such as FBI special agents and some inspectors for the Federal Government must have at least a bachelor's degree. College graduates are also increasingly being sought for many police officer jobs. In most cases, a college degree is an asset for advancement to higher level positions.

In addition to fulfilling educational requirements, most workers in protective and related services must undergo formal training programs and get on-the-job experience before they are fully qualified. Training programs last from several days to a few months and emphasize

specific job-related skills.

Personal qualifications such as honesty and an understanding of human nature are important. People seeking careers in protective and related service occupations should sincerely desire to serve the community and be able to exercise proper judgment under a variety of conditions.

This section describes several occupations in protective and related services: FBI special agents, State and local police, and health and regulatory inspectors.

FBI SPECIAL AGENTS

(D.O.T. 375.168)

Nature of the Work

Federal Bureau of Investigation (FBI) Special Agents investigate violations of Federal laws such as bank robberies, kidnappings, frauds against the Government, thefts of Government property, espionage, and sabotage. The FBI, which is part of the U.S. Department of Justice, has jurisdiction over more than 185 Federal investigative matters. Special Agents, therefore, may be assigned to any type of case; however, those with specialized training usually work on cases related to their background. Agents with an accounting background, for example, investigate frauds involving Federal Reserve Bank records.

Because the FBI is a fact-gathering agency, its Special Agents function strictly as investigators. (The FBI does not give personal protection to individuals or do police work to insure that the law is obeyed. Such matters are handled by local and State law enforcement agencies.)

To perform their duties, Special Agents may interview people, observe the activities of suspects, and participate in raids; their duties may involve extensive travel. Because the FBI's work is highly confidential, Special Agents may not disclose any of the information gathered in the course of their official duties to unauthorized persons, including members of their families. Agents may have to testify in court about cases which they investigate, but they do not make recommendations concerning prosecution or express opinions on the guilt or innocence of suspects.

Although they work alone on most assignments, agents communicate with their supervisors by radio or telephone as the circumstances dictate. In performing potentially dangerous duties, such as arrests and raids, two or more agents are assigned to work together.

Places of Employment

About 8,600 persons were Special Agents in 1972. Although the vast majority were men, in May, 1972, the FBI began accepting applications from women. There are now a small number of women assigned as Special Agents.

Most agents were assigned to the FBI's 59 field offices located throughout the Nation and in Puerto Rico. They worked in cities where field office headquarters are located or in resident agencies (sub-offices) established under field office supervision to provide prompt and economic handling of investigative matters arising throughout the field office territory. Some agents are assigned to the Bureau headquarters staff in Washington, D.C., which supervises all FBI activities.

Training, Other Qualifications, and Advancement

To be eligible for appointment as



FBI Special agents inspect car for fingerprints.

an FBI Special Agent, an applicant usually must have graduated from a State-accredited resident law school or a 4-year resident college with a major in accounting. The law school training must have been preceded by at least 2 years of resident undergraduate college work. Accounting graduates must have at least 1 year of experience in accounting, auditing, or a combination of both. In addition, the position is available to persons who have a 4-year resident college degree with a physical science major or fluency in a foreign language for which the FBI has a current need, or 3 years of professional, executive, complex investigative, or other specialized experience.

Applicants for the position of FBI Special Agent must be citizens of the United States, at least 23 and not more than 40 years old, and willing to serve anywhere in the United States or Puerto Rico. They must be

at least 5 feet 7 inches tall and capable of strenuous physical exertion; they must have excellent hearing and vision, normal color perception, and no physical defects which would prevent their using firearms or participating in dangerous assignments. Each applicant must pass a rigid physical examination, as well as written and oral examinations testing his knowledge of law or accounting and his aptitude for meeting the public and conducting investigations. All of the tests except the physical examinations are given by the FBI at its facilities. Exhaustive background and character investigations are made of all applicants. Appointments are made on a probationary basis and become permanent after 1 year of satisfactory service.

Each newly appointed Special Agent is given approximately 14 weeks of training at the FBI Academy at the U.S. Marine Corps Base in Quantico, Virginia before

assignment to a field office. During this period, agents receive intensive training in defensive tactics and firearms. In addition, they are thoroughly schooled in Federal criminal law and procedures, FBI rules and regulations, fingerprinting, and investigative work. After assignment to a field office, the new agent usually works closely with an experienced agent for about 2 weeks before handling any assignments independently.

All administrative and supervisory jobs are filled from within the ranks by selecting those FBI Special Agents who have demonstrated the ability to assume more responsible positions.

Employment Outlook

The FBI has experienced a substantial expansion in its jurisdiction over the years. Although it is impossible to forecast Special Agent personnel requirements, employment may be expected to increase with growing FBI responsibilities.

The FBI provides a career service and its rate of personnel turnover is traditionally low. Nevertheless, the FBI is always interested in applications from qualified persons who would like to be considered for the position of Special Agent.

Earnings and Working Conditions

The entrance salary for FBI Special Agents was \$12,776 in January 1973. Special Agents are not appointed under Federal Civil Service regulations, but, like other Federal employees, they receive periodic within-grade salary raises if their work performance is satisfactory; they can advance in grade as they gain experience.

Special Agents are subject to call 24 hours a day and must be avail-

able for assignment at all times and places. They frequently work longer than the customary 40-hour week and, under certain specified conditions, receive over-time pay up to \$3,000 a year. They are granted paid vacations, sick leave, and annuities on retirement.

Sources of Additional Information

The Federal Bureau of Investigation,
U.S. Department of Justice,
Washington, D.C. 20535.

POLICE OFFICERS

(D.O.T. 375.118 through .868
and 377.868)

Nature of the Work

The security of our Nation's cities and towns depends greatly on the work of local policemen whose jobs range from controlling traffic to preventing and investigating crimes. Whether on or off duty, these officers are expected to exercise their authority whenever necessary.

The policeman who works in a small community has many duties. In the course of a day's work, he may direct traffic at the scene of a fire, investigate a housebreaking, and give first aid to an accident victim. In a large police department, by contrast, officers usually are assigned to a specific type of duty. Most policemen are detailed either to patrol or traffic duty; smaller numbers are assigned to special work, such as accident prevention or operation of communications systems. Others work as detectives (plain-clothesmen) assigned to criminal investigation; still others, as experts in chemical and microscopic analysis, firearms identification, and handwriting and

fingerprint identification. In very large cities, a few officers may work with special units such as mounted and motorcycle police, harbor patrols, helicopter patrols, canine corps, mobile rescue teams and youth aid services.

Some city police departments have women on their forces. Although some are assigned to regular patrol duty, most work with juvenile delinquents, or search, question, book, and fingerprint women prisoners. They may also work with detective squads, where they normally handle crimes involving women.

Most newly recruited policemen begin on patrol duty. Patrolmen may be assigned to such varied areas as congested business districts, outlying residential areas, or other sections of a community. They may cover their beats alone or with other patrolmen, and they may ride in a police vehicle or walk on "foot"

patrol. In any case, they become thoroughly familiar with conditions throughout their area and, while on patrol, remain alert for anything unusual. They note suspicious circumstances, such as open windows or lights in vacant buildings, as well as hazards to public safety such as burned-out street lights or fallen trees. Patrolmen also watch for stolen automobiles and enforce traffic regulations. At regular intervals, they report to police headquarters through call boxes, by radio, or by walkie-talkie. They must also prepare reports about their activities and may be called on to testify in court when cases result in legal action.

Places of Employment

About 370,000 full-time officers worked for local police departments in 1972. Although most were men, an



increasing number of women are now being employed.

Some cities have very large police forces. For example, New York has over 30,000 police officers and Chicago over 13,000. Hundreds of small communities employ fewer than 25 policemen each. Police-women work mainly in large cities.

Training, Other Qualifications, and Advancement

Local civil service regulations govern the appointment of police officers in practically all large cities and in many small ones. Candidates must be U.S. citizens, usually at least 21 years of age, and be able to meet certain height and weight standards. Eligibility for appointment depends on performance on competitive examinations, as well as on education and experience. The physical examinations often include tests of strength and agility.

Because personal characteristics such as honesty, good judgment, and a sense of responsibility are especially important in police work, candidates are interviewed by a senior officer at police headquarters, and their character traits and background are investigated. In some police departments, candidates also may be interviewed by a psychiatrist or a psychologist, or given a personality test. Although police officers work independently, they must perform their duties in line with laws and departmental rules. They should enjoy working with people, and should want to serve the public.

In large police departments, where most jobs are found, applicants usually must have a high school education. A few cities require some college training and some hire law enforcement students as police interns. A few police departments accept men who have less than a high school education as recruits, particularly if they have worked in a field related to

law enforcement.

More and more police departments encourage applicants to take post-high school training in sociology and psychology. As a result, more than 500 junior colleges, colleges, and universities now offer programs in law enforcement. Other courses helpful in preparing for a police career include English, American history, civics and government, business law, and physics. Physical education and sports are especially helpful in developing the stamina and agility needed for police work.

Young persons who have completed high school can enter police work in some large cities as police cadets, or trainees, while still in their teens. As paid civilian employees of the police department, they attend classes to learn police skills and do clerical work. They may be appointed to the regular force at age 21 if they pass all necessary qualifications.

Before their first assignments, policemen usually go through a period of training. In small communities, recruits learn by working for a short time with experienced officers. Training provided in large city police departments is more formal and may last several weeks or a few months. This training includes classroom instruction in constitutional law and civil rights; in State laws and local ordinances; and in accident investigation, patrol, and traffic control. Recruits learn how to use a gun, defend themselves from attack, administer first aid, and deal with emergencies.

Policemen and policewomen usually become eligible for promotion after a specified length of service. In a large department, promotion may allow an officer to specialize in one type of police work such as laboratory work, traffic control, communications, or work with juveniles.

Promotions to the rank of sergeant, lieutenant, and captain usually are made according to each candidate's position on a promotion list, as determined by his performance on written examinations and his work as a police officer.

Many types of training help police officers improve their performance on the job and prepare for advancement. Through training given at police department academies and colleges, officers keep abreast of crowd-control techniques, civil defense, legal developments that affect policemen, and advances in law enforcement equipment. Many police departments encourage officers to work toward college degrees, and some pay all or part of the tuition.

Employment Outlook

Employment opportunities for police officers are expected to be favorable for qualified applicants through the mid-1980's. Police employment should rise rapidly as population and economic growth create a need for more officers to protect life and property, regulate traffic, and provide other police services. Many openings also will occur as policemen retire or leave their jobs for other reasons.

The use of modern police methods has increased the need for officers with specialized skills. In an increasing number of departments, for example, electronic data processing is used to compile administrative, criminal, and identification records, and to operate emergency communications systems. Many departments also need officers with specialized training to apply engineering techniques to traffic control or social work techniques to crime prevention. At the same time, the use of automatic signal lights has somewhat reduced the number of policemen needed for directing traffic.

Earnings and Working Conditions

In 1972, starting salaries of police officers in cities with populations of 100,000 or more averaged \$9,500 a year. Most officers receive regular salary increases during the first few years of employment until they reach a set maximum. Maximum earnings averaged just over \$11,000 a year in 1972. In general, police officers are paid about one and one-half times as much as nonsupervisory workers in private industry, except farming.

Although sergeants, lieutenants, and captains receive higher basic salaries than patrolmen, the highest earnings are paid to police chiefs or commissioners. These top law enforcement officials may earn as much as \$40,000 a year in the largest cities.

Police departments usually provide officers with special allowances for uniforms and furnish revolvers, night sticks, handcuffs, and other required equipment.

The scheduled workweek for police officers usually is 40 hours. Because police protection must be provided around the clock, in all but the smallest communities some officers are on duty over weekends, on holidays, and at night. Policemen are subject to call any time their services are needed and may work overtime in emergencies. In some departments, overtime is paid at straight time or time and a half; in others, officers may be given an equal amount of time off on another day of the week.

Police officers generally are covered by liberal pension plans, enabling many to retire at half pay by the time they reach age 55. In addition, paid vacations, sick leave, and medical and life insurance plans frequently are provided.

Policemen may have to work outdoors for long periods in all kinds of

weather. The injury rate is higher than in many occupations and reflects the risks officers take in pursuing speeding motorists, capturing lawbreakers, and dealing with public disorder.

Sources of Additional Information

Information about entrance requirements may be obtained from local civil service commissions or police departments.

Additional information describing careers as policemen or policewomen may be obtained from:

International Association of Chiefs of Police, 11 Firstfield Rd., Gaithersburg, Md. 20760.

Fraternal Order of Police, National Headquarters, 3094 Bertha St., Flint, Mich. 48504.

STATE POLICE OFFICERS

(D.O.T. 375.118, .138, .168, .228, .268, and .388)

Nature of the Work

The laws and regulations that govern the use of our Nation's roadways are designed to insure the safety of all citizens. State policemen (sometimes called State highway patrolmen or troopers) patrol our highways and enforce these laws.

State police officers issue traffic tickets to motorists who violate the law. At the scene of an accident, they direct traffic, give first aid, call for emergency equipment including ambulances, and write reports to be used in determining the cause of the accident.

In addition, State police officers provide services to motorists on the highways. For example, they radio for road service for drivers in mechanical trouble, direct tourists to their destination, or give informa-



State police investigate serious accident.

tion about lodging, restaurants, and tourist attractions.

State police officers also provide traffic assistance and control during road repairs, fires, and other emergencies, as well as for special occurrences such as parades and sports events. They sometimes check the weight of commercial vehicles, conduct driver examinations, and give information on highway safety to the public.

State policemen may investigate crimes, such as thefts, murders, and narcotics violations, particularly in areas that do not have a police force. They sometimes help city or county police investigate criminals, catch lawbreakers, and control civil disturbances. State highway patrols, however, normally are restricted to responsibilities involving vehicle and traffic matters.

Some police officers specialize in fingerprint classification, chemical or microscopic analysis of criminal evidence, instructing trainees in State police schools, and piloting police aircraft. Others work with special State police units such as the mounted police, canine corps, and marine patrols.

State police officers also write reports and maintain police records. Some officers, including division or bureau chiefs responsible for training or investigation and those who command police operations in an assigned area, have administrative duties.

Places of Employment

About 44,000 State police officers were employed in 1972. Although almost all were men, positions for women are expected to increase in the future.

The size of State police forces varies considerably. The largest force (in California) has over 5,000 officers; the smallest (in North

Dakota) has fewer than 100. One state (Hawaii) does not maintain a police force.

Training, Other Qualifications, and Advancement

State civil service regulations govern the appointment of State police officers. All candidates must be citizens of the United States. Other entry requirements vary by State, but most require applicants to have a high school education or an equivalent combination of education and experience and be at least 21 years old.

Officers must pass a competitive examination and meet physical and personal qualifications. Physical requirements include standards of height, weight, and eyesight. Tests of strength and agility often are required. Because honesty and a sense of responsibility are important in police work, an applicant's character and background are investigated.

Although State police officers work independently, they must perform their duties in line with department rules. They should want to serve the public and be willing to work outdoors in all types of weather.

In all States, recruits enter a formal training program for several months. They receive classroom instruction in State laws and jurisdictions, and they study procedures for accident investigation, patrol, and traffic control. Recruits learn to use guns, defend themselves from attack, handle an automobile at high speeds, and give first aid. After gaining experience, some officers take advanced training in police science, administration, law enforcement, or criminology. Classes are held at junior colleges, colleges and universities, or special police institutions such as the National Academy of the

Federal Bureau of Investigation.

High school and college courses in English, reading, government, psychology, sociology, and physics help in preparing for a police career. Physical education and sports are useful for developing stamina and agility. Completion of a driver education course and training received in military police schools also are assets.

Police officer recruits serve a probationary period ranging from six months to three years. After a specified length of time, officers become eligible for promotion. Most States have merit promotion systems that require officers to pass a competitive examination to qualify for the next highest rank. Although the organization of police forces varies by State, the typical avenue of advancement is from private to corporal, to sergeant, to first sergeant, to lieutenant, and then captain. Police officers who show administrative ability may be promoted to higher level jobs such as commissioner or director.

In some States, high school graduates may enter State police work as cadets. These paid civilian employees of the police organization attend classes to learn various aspects of police work and are assigned nonenforcement duties. Cadets who qualify may be appointed to the State police force at age 21.

Employment Outlook

State police employment is expected to rise very rapidly through the mid-1980's. Although most jobs will result from growth in employment, some openings will be to replace officers who retire, die, or leave the occupation for other reasons.

Although some State police will be needed in criminal investigation and other nonhighway functions, the greatest demand will be for officers

to work in highway patrol. This is the result of a growing and more mobile population. Along with an increasing number of motor vehicles, the nature of highway systems is rapidly changing. Limited access highways need heavier police patrol to control high speeds, prevent accidents, and help stranded motorists. The newer dual highways also require more patrolmen, because officers can handle only one side of these roads.

Because law enforcement work is becoming more complex, specialists will be needed in crime laboratories and electronic data processing centers to develop administrative and criminal information systems.

Earnings and Working Conditions

In 1972, beginning salaries for State policemen ranged from about \$500 to nearly \$800 a month. The most common entry rates ranged from \$600 to \$700 a month. Although starting salaries are normally higher in the West and lower in the South, State police officers on the average earn about one and one-half times as much as nonsupervisory workers in private industry, except farming.

State policemen generally receive regular increases, based on experience and performance, until a specified maximum is reached. The 1972 maximums ranged from \$700 to over \$1,200 a month; the most common maximum rates ranged between \$800 and \$900 a month. Earnings increase with promotions to higher ranks. The most common maximum salaries for State police sergeants were between \$900 and \$1,000. Lieutenants earn more, often between \$1,100 and \$1,200 a month.

State police agencies usually provide officers with uniforms, firearms, and other necessary equipment, or give special allowances for

their purchase.

In many States, the scheduled workweek for police officers is 40 hours. Although the workweek is longer in some States, hours over 40 are being reduced. Since police protection must be provided around the clock, some officers are on duty over weekends, on holidays, and at night. Police officers also are subject to emergency calls at any time.

State policemen usually are covered by liberal pension plans. Paid vacations, sick leave, and medical and life insurance plans frequently are provided.

The work of State police officers is sometimes dangerous. They always run the risk of an automobile accident while pursuing speeding motorists or fleeing criminals. Officers also face the risk of injury while apprehending criminals or controlling disorders.

Sources of Additional Information

Information about specific entrance requirements may be obtained from State civil service commissions or State police headquarters, usually located in each State Capitol.

HEALTH AND REGULATORY INSPECTORS (GOVERNMENT)

(D.O.T 168.168, 168.268, and 168.287)

Nature of the Work

Protecting the public from health and safety hazards, prohibiting unfair trade and employment practices, and raising revenue are includ-

ed in the wide range of responsibilities of government. Health and regulatory inspectors insure observance of the laws and regulations that govern these responsibilities.

The duties, titles, and responsibilities of Federal, State, and local health and regulatory inspectors vary widely. Some types of inspectors work only for the Federal Government while others also are employed by State and local governments. Health and regulatory inspectors are two of the principal types of government inspectors. For discussion of a third, see the statement on Construction Inspectors (Government) elsewhere in the *Handbook*. Many other workers employed as accountants, agricultural cooperative extension service workers, and other agricultural professionals, manufacturing inspectors, safety professionals, and sanitarians also have inspection duties.

Health inspectors work with engineers, chemists, microbiologists, and health workers to insure compliance with public health and safety regulations governing food, drugs, and various other consumer products. They also administer regulations that govern the quarantine of persons and products entering the United States from foreign countries. The major types of health inspectors are: food and drug, meat and poultry, egg products, foreign quarantine, and agricultural quarantine inspectors.

Federal, State, and local government laws declare that marketed foods must be wholesome and produced under sanitary conditions; that drugs, cosmetics, therapeutic devices, and other products must be safe and effective for their intended uses; and that such products must be honestly packaged and labeled. *Food and drug inspectors* make certain that the Nation's businesses comply with these laws.



Food and drug inspector checks food for leakage or signs of contamination.

Most food and drug inspectors specialize in one area of inspection such as food, feeds and pesticides, weights and measures, or drugs and cosmetics. Some, especially those who work for the Federal government, may be proficient in several of these areas. Working individually or in teams under the direction of a senior or supervisory inspector they travel throughout a geographical area to check, periodically, firms that produce, handle, store, and market food, drugs, and cosmetics. They look for evidence of inaccurate product labeling, decomposition, chemical or bacteriological contamination, and other factors that could result in a product becoming detrimental to consumer health. They assemble evidence of violations using portable scales, cameras, ultraviolet lights, container sampling devices, thermometers, chemical testing kits, and other types of equip-

ment.

Product samples collected as part of their examinations are sent to laboratories for analysis. After completing their inspection, they discuss their observations with the management of the plant and point out any areas where corrective measures are needed. They prepare written reports of their findings, and, when necessary, compile evidence that may be used in court if legal actions must be taken to effect compliance with the law.

Federal and State laws empower *meat and poultry inspectors* to inspect meat, poultry, and their by-products to insure that they are wholesome and safe for public consumption. Working as part of a constant on-site team under the general supervision of a veterinarian, they inspect meat and poultry, slaughtering, processing, and packaging operations. Those carcasses or parts

found to be safe and wholesome are conspicuously stamped to that effect.

They condemn as unfit for human consumption any animals, carcasses, or processed meat and poultry which they find displaying evidence of disease, contamination, or poor processing. Meat and poultry inspectors also collect samples for laboratory analysis and examine all non-meat ingredients used in processing. They check to see that products are labeled correctly and that proper sanitation is maintained in slaughtering and processing operations.

Egg products inspectors are entrusted by law with the responsibility of insuring that egg products are sanitarily processed and packaged free of contamination or spoilage. Working at egg processing plants, they supervise the washing and examination of shell eggs to insure that broken eggs are removed and destroyed or denatured. They supervise the processing, cooling, pasteurization, storage, and handling of all dried, liquid, or frozen egg products. Periodically, they select samples of processed egg products for laboratory analysis to insure that they have not spoiled or become contaminated due to improper storage or handling. Each day before production begins, they also inspect the plant and its equipment to insure that it has been properly cleaned and that the standards of sanitation are maintained.

The responsibility of *foreign quarantine inspectors* is to prevent the importation of communicable diseases. They inspect the passengers, crew, and cargo of aircraft, and maritime vessels arriving at airports and seaports, to determine their medical acceptability for entrance into the United States. Working closely with customs, immigration, and agricultural quarantine inspectors, they examine travelers for symptoms of diseases,

such as smallpox. Any individuals that they believe to be ill they detain for examination by a physician. Foreign quarantine inspectors also enforce regulations pertaining to the admission of animals into the United States since many diseases common to various species of animals are communicable to man. In addition, they prepare and maintain documents, certificates, and reports on persons or animals detained under suspicion of having contracted a communicable disease.

Agricultural quarantine inspectors protect American agricultural products from the introduction and spread of foreign plant pests and animal diseases. To safeguard the health of crops, forests, and gardens, they inspect ships, aircraft, railroad cars, and motor vehicles seeking to enter the United States for the presence of restricted or prohibited plant or animal materials. They often work with customs inspectors to inspect mail and passenger baggage. They examine fruits and vegetables, nursery stock, plants, seeds, and soil passing through ports of entry for the presence of foreign insects, mites, snails, or plant diseases. Plants and plant products restricted, suspected to be pest infested, or with which "hitchhiking" pests are associated are ordered destroyed or fumigated. Agricultural quarantine inspectors also examine meat and animal products and by-products entering the United States from foreign countries to determine that they are properly processed and do not carry dangerous foreign animal diseases. At the request of American exporters, they may also inspect and certify domestically grown plants and plant and animal products for compliance with the import requirements of foreign countries.

Regulatory inspectors insure compliance with various laws and regula-

tions that protect the public welfare. Important types of regulatory inspectors are: immigration, customs, aviation safety, mine, wage-hour compliance, and alcohol, tobacco, and firearms inspectors.

Immigration inspectors interview and examine people seeking admission, readmission, or the privileges of passing through or residing in the United States. They inspect the passports of aliens and U.S. citizens to determine whether they are legally eligible to enter the United States and to verify their citizenship, status, and identity. Working closely with inspectors in foreign quarantine, agricultural quarantine, and customs, they examine the visas of aliens and inquire as to the reasons for their visit. If they question an individual's admissibility, he can be detained. Immigration inspectors also prepare reports, maintain records, and process applications and petitions by aliens for privileges such as immigrating to or temporarily living in the United States.

Customs inspectors enforce the laws governing U.S. imports and exports. Stationed at airports, seaports, and border crossing points they count, weigh, gauge, measure, and sample commercial cargoes entering and leaving the United States to determine the amount of tax that must be paid. They also inspect baggage and articles worn or carried by the passengers and crew of ships, aircraft, and motor vehicles to insure that all merchandise being brought through ports of entry is declared and the proper taxes paid.

Most often, customs inspectors participate in a traveler inspection program at points that have a large volume of travelers passing through. They screen travelers and baggage for violations of immigration laws, public health quarantine regulations, or transportation of prohibited meats, plants, or other mate-

rials. Customs inspectors who work at isolated border crossing points often perform the added duties of health, immigration and agricultural inspecting. They also participate in the enforcement of gold, narcotics, and trademark restrictions and work with Federal Bureau of Investigation (FBI) agents, treasury agents, and other law enforcement officers. When not conducting inspections, they write reports and keep records.

Aviation safety officers insure that Federal Aviation Administration (FAA) regulations that govern the quality and safety of aircraft equipment and personnel are maintained. Aviation safety officers may inspect aircraft manufacturing, maintenance, or operations procedures. They usually specialize in inspecting either commercial air carriers or general aviation (privately owned and operated aircraft).

Working under the direction of a principal inspector, teams of from two to four manufacturing inspectors check the construction of every aircraft to assure that it conforms to its approved and certificated design. They spend about one half of their time visiting production facilities to make measurements and check the materials used during construction. Their results and observation are recorded and any changes or deviation they find from the certificated production model must receive approval or be corrected. They issue Airworthiness Certificates to acknowledge that an aircraft conforms to its design type. They also inspect manufacturers' production facilities and evaluate production methods and quality control systems in order to improve the quality and safety of aircraft being manufactured.

Aviation maintenance inspectors administer Federal regulations relating to the maintenance of com-

mercial and private aircraft. They periodically examine and certify mechanics, mechanic training programs, and schools. They also inspect and certificate aircraft repair and maintenance facilities and major overhauls of aircraft or alterations. They determine if work was performed in accordance with the manufacturer's latest instructions and FAA approved methods, techniques, and practices.

Aviation operation inspectors inspect and certify aircraft pilots and flight crews, training programs and schools, pilot examiners, flight instructors, and instructional materials. Most operations inspectors examine and certify the pilots and crews of one or two models of planes. They also observe the semiannual proficiency flight checks given commercial pilots by their airlines or supervise the activities of approved FAA pilot examiners and inspect and certify general aviation ground and flight instructors, pilots, and other airmen. Operations inspectors spend much of their time in the cockpit of aircraft observing the pilot and crews under actual flight conditions.

Mine inspectors work to enhance the health and safety of miners and to promote good mining practices. Federal mine inspectors are responsible for inspecting nearly 21,000 mining and quarrying operations.

To insure compliance with safety laws and regulations, mine inspectors visit mines and related facilities to obtain information on health and safety conditions. Before an inspection, they study the mine's permits, authorizations, and records to familiarize themselves with its operations. They note areas where violations were discovered in previous inspections and check on how these were corrected. At the work site, they look for evidence of flammable, combustible, or explosive gasses and dust and check roof sup-

ports, quantity of airflow, storage of explosives, haulage systems, and automatic mining equipment. They also inspect the surface equipment such as the electrical installations, elevators, and ventilation systems.

Mine inspectors discuss their findings with the management of the mine, prepare written reports that substantiate their findings and decisions, and issue notices of findings that describe violations and hazards that must be corrected. They also investigate and prepare reports on mine accidents and direct rescue and firefighting operations when fires or explosions occur.

Wage-hour compliance officers inspect the employer's time, payroll, and personnel records to insure compliance with the provisions of various Federal laws on minimum wages, overtime, pay, employment of minors, equal employment, and wage garnishment. They often interview employees to verify the employer's records and to check for any complaints. As recognized authorities on wage and hour standards, compliance officers often are consulted for advice by members of management and labor union officials.

Alcohol, tobacco, and firearms inspectors insure that the liquor, tobacco, and firearms industries comply with the provisions of revenue laws and other regulations on operating procedures, unfair competition, and trade practices. They spend most of their time inspecting distilleries, wineries, breweries; cigar and cigarette manufacturing plants; wholesale liquor dealers and importers; firearms and explosives manufacturers, dealers, and users; and other regulated facilities. They periodically audit these establishments to determine that appropriate taxes are correctly determined and paid. Alcohol, tobacco, and firearms inspectors also safeguard

against unfair competition and trade practices.

Places of Employment

Nearly 25,000 people, 5 percent of them women, worked as health and regulatory inspectors in 1972. Of these, about 3 out of 5 are health inspectors, nearly half of whom are food and drug inspectors. The largest single employer of food and drug inspectors is the U.S. Food and Drug Administration but the majority work for State governments. Meat, poultry, and egg products inspectors who work in processing plants are employed mainly by the U.S. Department of Agriculture. Foreign quarantine and agricultural quarantine inspectors work either for the U.S. Public Health Service or the U.S. Department of Agriculture.

Regulatory inspectors work for various agencies within the Federal Government, mainly in regional and district offices distributed throughout the United States. For example, aviation safety officers work for the Federal Aviation Administration; wage-hour compliance officers, for the Department of Labor; mine inspectors, the Department of the Interior; and alcohol, tobacco, and firearms inspectors, the Treasury Department. Immigration, customs, and foreign and agricultural quarantine inspectors work at airports, seaports, border crossing points, and at foreign airports and seaports. They are employed by the Justice and the Treasury Departments.

Training, Advancement, and Other Qualifications

People who want to become health or regulatory inspectors should be able to accept responsibility and like detail work. They should be neat and personable and able to express themselves well orally and in writing. Curiosity is important since inspec-

tors must keep abreast of technological advances and other developments in their fields. Persuasiveness also is an asset, since they frequently must convince people to comply with policies and procedures.

The U.S. Food and Drug Administration requires applicants for food and drug inspector jobs to have a bachelor of science degree which includes at least 18 semester hours of chemistry or biology. They also must achieve a satisfactory score on the Federal Service Entrance Examination (FSEE). Applicants who are accepted receive on-the-job training in the coverage of the Food, Drug, and Cosmetic Act, the extent of their authority, standards of sanitation and purity, inspections and sampling techniques, and the use of product testing equipment. They are given progressively more difficult field assignments under supervision until they are able to conduct independent inspections.

After 1 to 3 years of experience, food and drug inspectors may elect to specialize in bacteriological sanitation, food, or drug inspection. Courses in these specialized areas are given by the U.S. Food and Drug Administration, usually in conjunction with colleges and universities. Inspectors often become experts in their chosen specialty fields and may be promoted to senior inspector and then supervisory inspector. Inspectors who display a high level of expertise in a specialty occasionally transfer to administrative positions in that area of operation. Food and drug inspectors who do not choose to specialize may advance to senior or resident inspector and, if qualified, to supervisory inspector.

A high school diploma and experience in meat or poultry slaughtering or processing generally are minimum requirements for becoming a meat and poultry inspector. A college education may be substituted

for experience.

Working under the close supervision of experienced inspectors, trainees are taught plant inspection procedures that insure sanitary conditions and practices. They are instructed how to examine animals, carcasses, and processed meat and poultry for evidence of disease, contamination, or other undesirable conditions. When they are ready to assume their full inspectional duties, they usually begin as slaughter inspectors. After gaining experience they may advance to processing inspector, inspection supervisor, and officer-in-charge in a processing establishment.

A high school education and at least 3 years of experience in the quality control of fresh or processed food generally is the minimum requirement for employment as an egg products inspector. College education may be substituted for experience at the rate of one year of undergraduate study for 9 months of experience. Egg products inspectors receive classroom instruction in plant sanitation, facilities, proper handling of egg products, correct pasteurization procedures, sampling techniques, and record keeping. They get additional training on the job while working closely with an experienced inspector. Experienced inspectors can advance to supervisory positions.

Applicants for jobs as foreign quarantine inspectors should have at least 4 years of experience in communicable disease control or environmental sanitation; sanitary inspection at airports, seaports, or border points; performance of laboratory tests and analyses to determine the presence of germs or chemical composition; or recognizing illness, administering inoculations, and dispensing medicines. Courses above the high school level in the biological or physical sciences, public

health, or sanitary engineering may be substituted for up to 3 years of experience. Applicants also must take a written examination.

Foreign quarantine inspectors begin as trainees and attend a training center where they learn regulations and inspection techniques. They also receive on-the-job training. Experienced inspectors can advance to supervisory positions.

The minimum educational requirement for agricultural quarantine inspectors is a bachelor's degree with a major in one of the biological sciences. Undergraduate work should include at least 20 semester hours in the life sciences. They receive additional on-the-job training and classroom instruction in these subjects during their first year of employment. After one year of successful service, inspectors are eligible for promotion and may eventually progress to specialists, supervisory, or administrative positions.

People can enter the immigration inspection field as an aide or trainee if they have a minimum of 3 years of administrative or responsible clerical work experience that demonstrates their ability to deal with people, learn and interpret facts, and obtain the cooperation of others in following procedures and regulations. College training may be substituted for up to 3 years of general experience at the rate of one scholastic year for 9 months of experience. Applicants must take the FSEE.

Immigration aides and inspector trainees receive a combination of formal instruction and on-the-job training. Trainees may be promoted after their first year of duty and may reach the journeyman level after an additional year. Further advancement to immigration examiner or supervisory and administrative positions depends upon individual merit.

The minimum requirement for

beginning customs inspector jobs is 4 years of work experience in government, education, business, or the Armed Forces dealing with people and enforcing regulations or instructions. College education may be substituted for up to three years of experience at the rate of one year of college for 9 months of experience. Completion of all requirements for a law degree may be substituted for all experience. Applicants must take the FSEE, be in good physical condition, and be free of handicaps which might hinder them in the performance of their duties.

Customs inspectors begin as trainees and receive over a month of formal instruction in their duties. After a year of on-the-job training in which they work an experienced inspector, they receive regular assignments. Advancement is possible to supervisory inspector or to administrative positions.

At least 5 years of aviation related experience usually is required to get a job as an aviation safety officer. Resident study in an appropriate field at an accredited college or university, however, may be substituted for up to 3 years of experience. Maintenance inspector applicants must have aircraft maintenance experience and hold an FAA mechanics certificate. Manufacturing inspector applicants must have experience in manufacturing of aircraft and aircraft components. Applicants for these positions may substitute a bachelor's degree in engineering or aviation for 3 years of experience. Operations inspector applicants must have pilot experience and a commercial pilot certificate.

Aviation safety officers are trained on-the-job and usually attend a 5-week indoctrination course in Oklahoma City. They periodically receive additional training to familiarize them with the operation, main-

tenance, or inspection of various models of aircraft or new aircraft manufacturing technology. Qualified aviation safety officers may advance to supervisory inspector, principal inspector, or district office supervisor.

Applicants for beginning mine inspection jobs must be in good physical condition and possess at least 3 years of experience in mining or construction work where underground excavation is the principal activity. They also must take a general aptitude test and demonstrate their ability to drive a car. Persons who have at least 5 years of responsible experience in the mining industry are not required to take the aptitude test and may begin at higher salaries. A bachelor's degree may be substituted for 3 years of experience.

Trainees receive 10 weeks of classroom training in math, English, public speaking, inspection procedures, mining technology, surface structures, ventilation systems, roof supports, respirable dust, and fire protection. They also receive on-the-job training by teaming with an experienced inspector. Their inspection assignments become progressively more difficult until they are able to make a solo inspection.

Mine inspectors can advance to inspection supervisors, subdistrict and district managers, and specialists in dealing with specific types of mine hazards. Many become mine examiners or mine safety personnel in private industry.

Wage-hour compliance officers should have a bachelor's degree from an accredited college or university with at least 24 semester hours credit in any one or a combination of accounting, business administration, economics, government, industrial relations, journalism, law, political science, sociology, statistics, or closely related subjects. Three years of non-clerical work experience that provides knowledge of the basic principles of finance, economics, ac-

counting, statistics, law, business, or public administration may be substituted for a bachelor's degree. After a few weeks on the job, compliance officer trainees attend a 4-week training program to acquaint them with wage-hour laws and standards. They accompany experienced compliance officers on field assignments and help them make inspections until they are ready to undertake independent assignments.

At least 3 years of working experience are generally the minimum requirement to become an alcohol and tobacco tax inspector. Education at an accredited college or university may be substituted for experience at the rate of one year of study for 9 months of experience or a bachelor's degree in lieu of experience. Applicants also must achieve a satisfactory score on the Federal Service Entrance Examination (FSEE).

People enter the field as trainee inspectors and receive a year of training that includes classroom instruction in the laws of regulations governing liquor, tobacco, and firearms industries; orientation in the inspection techniques used to determine compliance; and on-the-job training under the close supervision of an experienced inspector. The complexity of their assignments is gradually increased until they can work independently.

Employment Outlook

Employment of health and regulatory inspectors as a group is expected to increase very rapidly through the mid-1980's. The growth in employment of health inspectors is expected to be very rapid but regulatory inspectors are expected to have moderate growth. In addition to job opportunities stemming from growth, many inspectors will be needed each year to replace those who die, retire, or transfer to other

occupations.

Health and regulatory inspection programs are expected to receive increased emphasis as the importance of existing programs is recognized and new mandatory inspection programs are created in areas where government involvement is new, particularly at the State and local level. Increased food consumption caused by population growth and growing public concern over potential health hazards should create additional jobs for food and drug, meat, and poultry, and egg products inspectors.

Aviation industry growth, increased international travel, and increases in the volume of U.S. imports and exports should continue to create new openings for aviation safety officers, foreign and agricultural quarantine inspectors, immigration inspectors, and customs inspectors. Continued public concern over mine safety and equal employment rights should create additional mine inspector and wage-hour compliance officer jobs.

Earnings and Working Conditions

With the exception of aviation

safety officers, the Federal Government paid health and regulatory inspector trainees starting salaries of \$7,694 a year in early 1973; or \$9,520 if they had exceptional qualifications. Aviation safety officers received starting salaries of \$11,614.

Salaries of experienced meat and poultry inspectors, egg products inspectors, foreign and agricultural quarantine inspectors, and customs and immigration inspectors ranged from \$11,614 to \$15,097 a year in 1973. Salaries of experienced alcohol, tobacco, and firearms inspectors ranged from \$11,614 to \$18,190. Experienced food and drug inspectors and wage-hour compliance officers received salaries ranging from \$13,996 to \$18,190. Mine inspector and aviation safety officers earned between \$16,682 and \$21,686.

Most health and regulatory inspectors live an active life, meeting many people and working in a variety of environments. They must often travel a great deal but are usually furnished with an automobile.

At times inspectors must work under unfavorable working conditions. For example, meat and poultry, egg products, and alcohol, tobacco, and

firearms inspectors frequently come in contact with strong, unpleasant odors; aviation maintenance inspectors who spend much of their time in maintenance and repair shops, must tolerate a lot of noise, and mine inspectors spend a great deal of time in mines where they are exposed to the same hazards as miners. Many inspectors work long and often irregular hours.

Sources of Additional Information

For facts about public administration inspector careers in the Federal Government, contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C. 1900 E St. NW., Washington, D.C. 20415.

Information about career opportunities as inspectors in State and local governments is available from the State Civil Service Commissions, usually located in each State capital, or from local government offices.

EDUCATION AND RELATED OCCUPATIONS

The industrial and occupational structure of the Nation has gradually shifted from goods-producing to service-producing, white-collar activities. Accompanying this shift has been a continued rise in the educational attainment of the labor force—in part reflecting changing job requirements. People also have more time to spend on education and personal development.

Today about 3 out of 10 people of all ages participate in the educational process as students or teachers. Many more study on their own. The teaching occupations and librarians play a vital role in the educational process.

Teaching is the largest of the professions; about 2.7 million full-time teachers were employed in 1972–73 in the Nation's elementary and secondary schools and colleges and universities. In addition, thousands taught part time; among them were scientists, physicians, accountants, members of other professions, and graduate students. Similarly, large numbers of craftsmen gave instruction part time in vocational schools. Many other people taught in preschool and adult education and recreation programs. Four-fifths of all teachers had four or more years of college education in 1972.

No other profession offers women as many employment opportunities as teaching. About 1.7 million or nearly 2½ times as many women are teachers as are registered nurses, the second largest profession for women.

The number of teachers required depends on the number of students enrolled and the number of persons who leave the profession. New

teachers also are needed to decrease the size of classes.

Detailed information on how these demand factors are expected to affect the outlook for teachers through the mid-1980's is presented in the following statements.

KINDERGARTEN AND ELEMENTARY SCHOOL TEACHERS

(D.O.T. 092.228)

Nature of the Work

Kindergarten and elementary school teachers introduce children to science, numbers, language, and social studies, and develop students'

capabilities in these subject areas. Their primary job is to provide a good learning environment and to plan and present programs of instruction using materials and methods designed to suit the students' needs.

Most elementary school teachers instruct a single group of 25 to 30 children in several subjects. In some schools two or more teachers "team teach" and are jointly responsible for a group of students or for a particular subject. A recent survey indicates that about 1 public elementary school teacher in 6 is team teaching.

An increasing number of elementary school teachers specialize in one or two selected subjects and teach these subjects to several classes; 1 teacher in every 5 teaches on this departmentalized basis. Some teach special subjects such as music, art, or physical education, while others teach basic subjects such as English, mathematics, or social studies.

Besides the actual student instruc-



tion, teachers participate in many activities outside the classroom. They generally must attend regularly scheduled faculty meetings and may serve on faculty committees. They must prepare lessons and evaluate student performance. They also work with students who require special help and confer with parents and other school staff. To stay up-to-date on educational materials and teaching techniques, they participate in workshops and other in-service activities.

New forms of instructional media give teachers more opportunities to work with students. Also, about 4 out of every 10 public elementary school teachers have aides who generally do secretarial work and help supervise lunch and playground activities. Thus, growing numbers of teachers are freed from routine duties and can give more individual attention to students.

Places of Employment

More than 1.3 million people—85 percent of them women—worked as elementary school teachers in 1972. An increasing number of men, concentrated heavily in the upper grades, teach at the elementary level.

Most teachers work in public elementary schools that have six grades; however, some teach in middle schools—schools that cover the three or four years between the lower elementary grades and four years of high school. Only about 11 percent of elementary school teachers work in nonpublic schools.

More than one-third of all public elementary teachers teach in urban areas; about one-fifth in cities of 250,000 or more; one-eighth in rural areas; and the remainder in small towns or suburban areas.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require public elementary school teachers to be certified by the department of education in the State in which they work. Some States also require certification of teachers in private and parochial schools.

To qualify for certification, a teacher must study 4 years at an approved teacher education institution. Besides a bachelor's degree which provides the necessary liberal arts background, States require that prospective teachers have student-teaching and education courses.

In 1972, 11 States required teachers to get supplementary post-graduate education—usually a master's degree or a fifth year of study—within a certain period after their initial certification. Some States required U.S. citizenship; some an oath of allegiance; and several a health certificate.

Local school systems sometimes have additional requirements for employment. Students should write to the local superintendent of schools and to the State department of education for information on specific requirements in the area in which they want to teach.

In addition to educational and certification requirements, a teacher should be dependable, have good judgment, and should have the desire and ability to work with children. Enthusiasm for teaching and the competence to handle classroom situations also are important.

Opportunities for advancement in elementary teaching come principally with experience. Teachers may advance within a school system or transfer to another which recognizes experience and has a higher salary scale. Some teachers may advance to supervisory, administrative, or specialized positions.

Employment Outlook

Kindergarten and elementary school teachers are expected to face competition for jobs through the mid-1980's. If patterns of entry and reentry to the profession continue in line with past trends, the number of persons qualified to teach in elementary schools will exceed the number of openings.

Enrollment is the basic factor underlying the need for teachers. Because of fewer births in the sixties, elementary enrollments have been on the decline since they peaked at nearly 32 million in 1967. The U.S. Office of Education projects that by 1977 the downward enrollment trend will halt at a level of 29 million, and enrollments again will advance to nearly 35 million by 1985.

Besides new positions created by increasing enrollments, additional teachers will be needed to replace those who are not now certified; to meet the expected pressure for an improved pupil-teacher ratio; and to fill positions vacated by teachers who retire, die, or leave the profession for other reasons. Many persons leave teaching at least temporarily to take on full-time homemaking or family responsibilities.

Recent college graduates qualified to teach at the elementary level and teachers seeking reentry to the profession make up the basic source of teacher supply. Through the mid-1980's reentrants to the field will face increasing competition from new graduates, and although reentrants have experience in their favor, beginning teachers may have an advantage because they command lower salaries and have more recent training.

While the outlook based on past trends points to a competitive employment situation through the mid-1980's, several factors could influence the demand for teachers. In-

creased emphasis on early childhood education, special programs for disadvantaged children, and individual instruction may result in larger enrollments, smaller student-teacher ratios, and consequently an increased need for teachers. However, possible budget restraints for educational services might limit program expansion.

A potential decline in the number of children born over the next decade could produce a decrease in the demand for teachers. While the trend has not been clearly established, women since 1970 have continued to have fewer children, and according to a 1972 survey, they expect to continue having smaller families than were common 10 years ago.

Earnings and Working Conditions

According to the National Education Association (NEA), public elementary teachers in 1972-73 averaged \$9,823 a year. Average earnings in 1972 were about one and one-third times as much as the average earnings for nonsupervisory workers in private industry, except farming. In the five highest-paying States (Alaska, New York, Michigan, California, and New Jersey), teachers' salaries averaged more than \$11,000; in the ten States having the lowest salaries (Mississippi, Arkansas, Idaho, South Dakota, Kentucky, Oklahoma, North Dakota, South Carolina, West Virginia, and Georgia), they averaged less than \$8,000.

Public schools systems enrolling 6,000 or more pupils paid teachers with a bachelor's degree average starting salaries of \$7,357 a year in 1972-73; those with a master's degree earned an average of \$8,176.

Public elementary teachers worked an average of about 36-1/2 hours a week in 1972. Additional time

spent preparing lessons, grading papers, making reports, attending meetings, and supervising extra-curricular activities increased the total number of hours to about 46.

The elementary teacher usually works 9 months and averages 181 days in the classroom and 4 workdays on nonteaching activities. In addition, many teach summer sessions, and others take courses for professional growth or work at other jobs during the summer months.

Employment in teaching is steady, and business conditions usually do not affect the market for teachers. In 1972, 38 States and the District of Columbia had tenure laws that insured the jobs of teachers who had successfully taught for a certain number of years.

Collective bargaining agreements cover an increasingly large number of teachers. In early 1973, 30 States had enacted laws which required collective bargaining in the teacher contract negotiation process. More than one-half of the public school systems that enroll 1,000 students or more bargain with teacher organizations over wages, hours, and the terms and conditions of employment.

Sources of Additional Information

Information on schools and certification requirements is available from local school systems and State departments of education.

Information on the Teacher Corps, internships, graduate fellowships, and other information on teaching may be obtained from:

U.S. Department of Health, Education, and Welfare, Office of Education, Washington, D.C. 20202.

Other sources of general information are:

American Federation of Teachers, 1012 14th St. NW., Washington, D.C. 20005.

National Educational Association, 1201 16th St. NW., Washington, D.C. 20036.

SECONDARY SCHOOL TEACHERS

(D.O.T. 091.228)

Nature of the Work

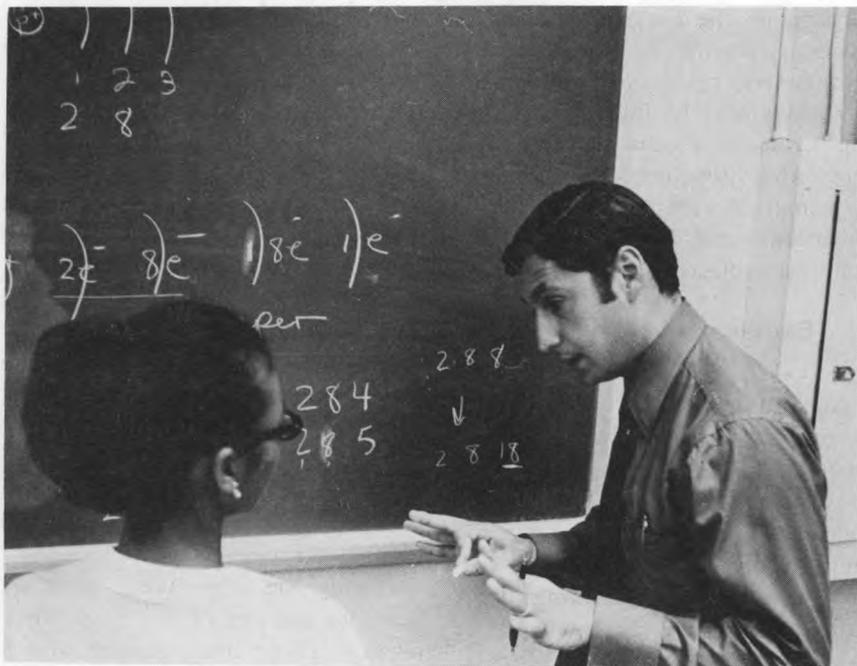
Secondary school teachers introduce students to subjects ranging from world history and elementary algebra to anthropology and computer mathematics. They help mold their students for future roles as citizens, homemakers, and jobholders.

Secondary school teachers usually specialize in a particular field. English, mathematics, social studies, and science are the subjects most commonly taught. Other specialties include health and physical education, business education, home economics, foreign languages, and music. Increasingly, teachers are developing courses which deal with particular areas within the broad subjects so students may acquire in-depth as well as general knowledge of a field.

Secondary school teachers usually conduct classes in their specialty for 5 or 6 groups of students a day. The average daily pupil load for public school teachers is 134 students.

Teachers design their classroom presentation to meet the demands of a balanced curriculum and to suit the individual student's needs. Secondary school teachers instruct students at a single grade level or from different grades. They must consider the subject matter, as well as instructional methods and materials that best meet the students' needs.

Secondary school teachers also supervise study halls and home-



A chemistry teacher provides his student with special help.

rooms, prepare lessons, grade papers, evaluate students, and attend meetings with parents and school personnel. Often they work with student groups outside of class. Teachers also participate in activities, such as workshops and college classes, to keep up-to-date on their subject specialty and on current trends in education.

Increasingly, in recent years, teachers have been able to devote more time towards improved instruction due to the increased availability of teacher aides who perform secretarial work, grade papers, and do other routine tasks. New developments in educational technology also have provided teachers with instructional media and other new materials and techniques to improve student learning.

Places of Employment

More than 1 million teachers worked in secondary schools in 1972.

Of these, about one-half were women.

According to a recent survey, slightly more than one-half of all public secondary teachers work in senior high schools; about one-third teach at the junior high level. About one-tenth teach in junior-senior high schools, and a very small number are elementary-secondary combination teachers.

Of those in public schools, about 1 teacher in 5 works in a city of 250,000 or more; 1 in 8 in a city of less than 250,000. Over one-half teach in small town or suburban schools; and about 1 in 7 in a rural location. Only about 1 teacher in 14 works in a non-public school.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require the certification of public secondary school teachers. Many States also require certifi-

cation of secondary teachers in private and parochial schools.

In every State, the minimum educational requirement for certification is a bachelor's degree. Moreover, 12 States have specified that a secondary school teacher must get additional education, usually a fifth-year of study or a master's degree, within a certain period after beginning employment.

In 1972, the District of Columbia was the only jurisdiction requiring a master's degree for initial certification as a senior high school teacher. However, according to a recent national survey, 2 out of every 5 public secondary school teachers had a master's or higher degree.

The educational qualifications for secondary school teachers vary by State and by school system. Approved colleges and universities in every State offer programs which include the education courses and student-teaching that States require. They also offer the academic courses which qualify teachers in subject specialties taught at the secondary level.

States and local jurisdictions often have general teacher requirements, such as the recommendation of the college, a certificate of health, and citizenship. Prospective teachers may get complete information on such educational and general requirements from each State department of education and from the superintendent of schools in each community.

Personal qualifications which a secondary teacher must have include a desire to work with young people, an interest in a special subject, and the ability to motivate students and to relate knowledge to them.

For secondary teachers, education and experience provide the primary bases for advancement. Advancement to supervisory and administrative positions usually re-

quires at least 1 year of professional education beyond the bachelor's degree and several years of successful classroom teaching. Some experienced teachers with special preparation may work as special school service personnel, such as school psychologists, educational specialists, or guidance counselors. Often these jobs require special certification as well as special education.

Employment Outlook

The supply of secondary school teachers through the mid-1980's will greatly exceed anticipated requirements if past trends of entry into the profession continue. As a result, prospective teachers are likely to face keen competition for jobs.

U.S. Office of Education projections indicate that enrollments in secondary schools will begin to decline in the mid-1970's after continuous growth through the 1960's and into the early seventies. Enrollments are expected to increase slightly in the 1980's, but by 1985 are expected still to be below the 1972 level. Thus, over the 1972-85 period nearly all teaching positions will stem from the need to replace the tens of thousands of teachers who die, retire, or leave the profession for other reasons. Pressures for an improved pupil-teacher ratio and replacement of noncertified teachers will create additional openings.

At the same time demand is leveling off, the number of qualified graduates—the basic source of supply—will continue to grow rapidly, and other teachers will seek reentry to the profession. As a result, an increasing proportion of prospective teachers will have to consider alternatives to secondary school teaching. Many schools may favor hiring new graduates who command lower salaries and whose training is more recent rather than experienced reentrants.

Although the overall outlook for secondary teachers indicates a highly competitive market, employment conditions may be favorable in certain fields. A recent survey found continuing teacher shortages in mathematics, industrial arts, special education, and some vocational-technical subjects.

Earnings and Working Conditions

According to the National Education Association (NEA), public secondary school teachers in 1972-73 averaged \$10,460. This is one and one-half times the average for nonsupervisory workers in private industry, except farming. NEA estimates indicate that 11 States (Alaska, New York, California, Michigan, Illinois, New Jersey, Maryland, Minnesota, Arizona, Nevada, and Connecticut) paid average annual salaries of \$11,000 or more, and 3 (Mississippi, Arkansas, and Idaho) paid secondary school teachers less than \$8,000 a year.

Beginning teachers with a bachelor's degree in school systems with enrollments of 6,000 or more earned average salaries of \$7,357 in school year 1972-73. New teachers with a master's degree started at \$8,176 a year. Beginning teachers could expect regular salary increases as they gained experience and additional education.

A recent survey of public school teachers indicated that the average required school week for those in secondary schools was 37 hours. However, when all teaching duties, including meetings, lesson preparation, and other necessary tasks are taken into consideration, the total number of hours spent working each week was slightly more than 48.

In some schools, teachers receive supplementary pay for certain school-related activities such as coaching students in sports and

working with students in extra-curricular music, dramatics, or school publications. About one-fourth of the public secondary teachers receive pay for extra duties, and one-third supplement their incomes with earnings from additional school work.

One-sixth of public school teachers also work in their school systems during the summer. More than one-fourth hold summer jobs outside the school system. In all, about three-fifths of public secondary school teachers have extra earnings from summer work, additional school-year work, or a combination of the two.

During the school-year, teachers work an average of 181 days. They average 26 teaching periods and 5 unassigned periods a week. Laws in 38 States and the District of Columbia ensure the employment of those who have achieved tenure status. Laws requiring collective bargaining of wages, hours, and the terms and conditions of employment cover increasing numbers of teachers.

Sources of Additional Information

Information on schools and certification requirements is available from local school systems and State departments of education.

Information on the Teacher Corps, internships, graduate fellowships, and other information on teaching may be obtained from:

U.S. Department of Health, Education, and Welfare, Office of Education, Washington, D.C. 20202.

Other sources of general information are:

American Federation of Teachers, 1012 14th St. NW., Washington, D.C. 20005,

National Education Association, 1201 16th St. NW., Washington, D.C. 20036.

COLLEGE AND UNIVERSITY TEACHERS

(D.O.T. 090.168 through .999)

Nature of the Work

About 60 percent of all persons in the United States between 18 and 21 attended college in 1972, compared with 40 percent ten years ago. To meet the demand of students for higher education, colleges and universities hire teachers to provide instruction in many fields. The most common subjects include the social sciences, teacher education, the physical sciences, health professions, fine and applied arts, English, the biological sciences, mathematics, foreign languages, and business and commerce.

Slightly more than one-half of all college and university teachers instruct undergraduates; another one-third teach both graduates and undergraduates; and about one-tenth work only with graduate students.

Most teachers lecture and conduct classroom discussions to present subject matter effectively. Many work with students in laboratories. Some teachers provide individual instruction or supervise independent study. Nearly one-third of the faculty in universities have teaching assistants. Some college and university teachers use closed-circuit television, and especially in two-year colleges, instruction is machine-aided.

To be effective, college teachers must keep up with developments in their field by reading current material, participating in professional activities, and conducting research. Some publish books and articles. The importance of research and publication varies from one institutional level to another. In universities, about 70 percent of the faculty have published professional arti-

cles compared to 25 percent of 2-year college faculty. Also, in certain fields, such as engineering and the physical sciences, the demand for research is strong.

In addition to time spent on preparation, instruction, and evaluation, college and university teachers also participate in faculty activities; work with student organizations and individual students outside of classes; work with the college administration; and in other ways serve the institution and the community. Some are department chairmen and have supervisory duties.

Places of Employment

In 1972, about 620,000 teachers worked in more than 2,600 colleges and universities. An estimated 395,000—nearly two-thirds—were full-time senior staff. Of the remainder, about 110,000 were part-time senior staff, and nearly 20,000 were

full-time junior instructors; the rest generally worked as part-time assistant instructors, teaching fellows, teaching assistants, or laboratory assistants.

Of full-time faculty, about one-third teach in universities; nearly one-half work in 4-year colleges; and about one-seventh teach in 2-year colleges. About two-thirds of the faculty in universities and 4-year colleges teach in public institutions; nearly nine-tenths of the faculty in two-year institutions work in public junior and community colleges.

In 1972, about one-fourth of all college and university teachers were women. Women worked more frequently in 2-year colleges than in 4-year colleges and universities and were more likely to teach certain subjects such as nursing, home economics, and library science. On the other hand, men were the principal instructors in agriculture, law,



the earth sciences, engineering, and other subjects.

Training, Other Qualifications, and Advancement

Most college and university faculty are classified in four academic ranks: instructors, assistant professors, associate professors, and full professors. About one-fifth of all faculty are instructors; another one-fifth are professors. Slightly more than one-third are assistant professors; and one-fourth are associate professors.

To get an initial appointment, instructors generally must have a master's degree. For advancement to higher ranks, they need further academic training plus experience. Assistant professors usually need a year of graduate study beyond the master's degree and at least a year or two of experience as an instructor. Appointments as associate professors frequently demand the doctoral degree and an additional 3 or more years of college teaching experience. For a full professorship, the doctorate and extensive teaching experience are essential.

In addition to advanced study and college-level teaching experience, outstanding academic, administrative, and professional contributions influence advancement. Research, publication, and work experience in a subject area may hasten advancement.

The ranks of college and university teachers and their educational backgrounds differ by institutional level. In universities, more than 50 percent of the faculty have doctoral degrees compared with less than 10 percent in 2-year colleges. Correspondingly, more than 50 percent of the faculty in universities are either professors or associate professors, while in 2-year colleges, only 1 teacher in 6 is within these upper

ranks. Conversely, in community and junior colleges, where the master's is the highest degree held by nearly two-thirds of the faculty, instructors constitute a relatively large faculty segment.

Teachers should be able to motivate students and to adapt their field of study to students' needs and interests.

Employment Outlook

Entrants to college and university teaching are expected to face keen competition through the mid-1980's. Although the demand for teachers will continue to expand, the supply of new doctoral and master's degree graduates—the principal source of teacher supply—is expected to more than meet these needs.

College enrollment represents the basic factor underlying the demand for teachers. During the 1960's and early 1970's, teacher employment expanded due to growth in both the number of college-age persons and the proportion of 18- to 21-year olds enrolled in college. While the proportion attending college is expected to continue to rise, the number of college-age persons will decline after 1978, and by the early 1980's, enrollment will taper off and begin to fall. Over the 1972-85 period, the total number of college teachers needed is expected to rise only 20 percent. This compares with a more than 100 percent increase over the previous 13-year period.

Through the mid-1980's as demand is slowing, the numbers of both master's and Ph.D. degree recipients are expected to grow rapidly. Consequently, a smaller proportion of each year's degree recipients will be needed for college teaching. An increasing proportion of prospective college teachers, therefore, will have to seek nonacademic jobs. Alternative opportunities will exist in

government and industry, which have traditionally competed with colleges and universities for Ph.D.'s and holders of master's degrees. Also, some of those persons holding graduate degrees may find it increasingly necessary to enter occupations that have not traditionally required advanced levels of study. Secondary school teaching may provide opportunities for an increasing number of master's graduates.

The employment outlook also depends on the institutional level and on the teacher's qualifications. Although enrollments in the 1970's are expected to stabilize in 4-year colleges and universities, many institutions, including junior and community colleges, may hire additional Ph.D.'s to upgrade their faculties. Master's graduates also will continue to find jobs in 2-year colleges. Public institutions are expected to continue to attract an increasing proportion of total college enrollment. Thus, opportunities in public colleges will be greater than in private institutions.

Earnings and Working Conditions

In 1972-73, full-time college and university faculty on 9-10 month contracts averaged \$13,813, or twice the average earnings for nonsupervisory workers in private industry, except farming. Salaries varied, however, by teacher rank and by institutional level. Average salaries were:

Instructors	\$10,662
Assistant professors	12,046
Associate professors	14,354
Professors	18,916

In general, larger institutions paid higher salaries. Salaries of teachers in 4-year colleges tended to be higher than those in 2-year colleges; university teachers averaged the highest salaries.

College and university teachers' salaries also vary by geographic region. According to a recent survey of 4-year colleges and universities, schools in the Mideast and New England paid the highest full-time faculty salaries.

Since about 2 out of 3 college teachers have 9-10 month contracts, many have additional summer earnings from research, writing for publication, or other employment. Royalties and fees for speaking engagements may provide additional earnings. Some teachers also undertake additional teaching or research projects or work as consultants.

College and university teachers also may enjoy certain benefits, including tuition waivers for dependents, housing allowances, travel allowances, and leaves of absence. Colleges typically grant a semester's leave after 6 or 7 years of employment.

About 95 percent of all college and university teachers work in institutions which have tenure systems. Of the full-time teachers employed in these institutions, over one-half are tenured. Under a tenure system, a teacher usually receives 1-year contracts for a probationary period ranging from 3 to 7 years; some universities award 2- or 3-year contracts. After the probationary period, institutions consider teachers for tenure and the assurance of continuing employment with freedom from dismissal without cause.

The working hours and environment of college teachers generally are favorable. Classrooms, office facilities, and laboratories usually are well-equipped and teachers have access to library facilities and clerical assistance.

College teachers usually have flexible teaching schedules. According to a recent survey, the undergraduate faculty in 4-year colleges

and universities normally teach 12 hours and usually no more than 14 or 15 hours a week. Graduate faculty have a teaching load of about 10 hours a week. In addition to time spent in the classroom, college and university teachers devote much time to preparation and other duties. Overall, full-time faculty spend about 40 hours a week on school-related activities. For faculty in junior and community colleges, the normal teaching load is slightly heavier, but the total number of hours on the job are fewer.

Sources of Additional Information

Information on college teaching as a career is available from:

U.S. Department of Health, Education, and Welfare, Office of Education, Washington, D.C. 20202.

American Association of University Professors, 1 Dupont Circle NW., Washington, D.C. 20036.

American Council on Education, 1 Dupont Circle NW., Washington, D.C. 20036.

American Federation of Teachers, 1012 14th St. NW., Washington, D.C. 20065.

Professional societies in the various subject fields will generally provide information on teaching requirements and employment opportunities in their particular fields. Names and addresses of societies are given in the statements on specific professions elsewhere in the *Handbook*.

LIBRARIANS

(D.O.T. 100.118 through .388)

Nature of the Work

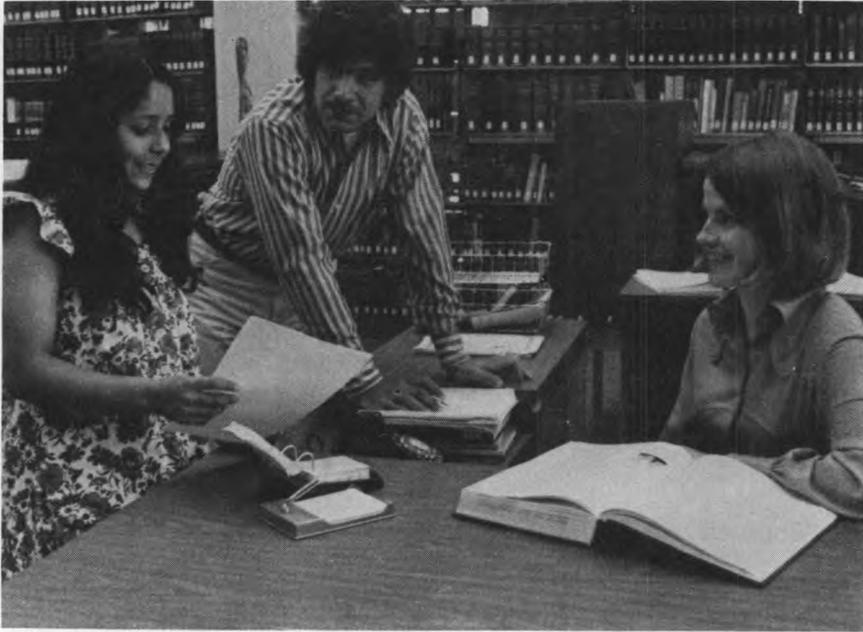
Making information available to people is the job of librarians. They select and organize collections of books, pamphlets, manuscripts, periodicals, clippings, and reports, and assist readers in their use. In many libraries, they also provide phonograph records, maps, slides, pictures, tapes, films, paintings, braille and talking books, microfilms, and computer tapes and programs.

Through the librarian, information in the library becomes available to users. Librarians classify and catalogue materials.

Two principal kinds of library work are reader and technical services. Librarians in reader services—for example, reference and children's librarians—work directly with the public. Librarians in technical services—for example, catalogers and acquisitions librarians—deal less frequently with the public; they order, classify, catalog, and in other ways prepare the materials for use.

The size of the library determines to a large extent the scope of a librarian's job. In small libraries, the job may include both technical and reader services. The librarian may select and organize materials, publicize services, do research, and give reference help to groups and individuals. In large libraries, librarians usually specialize in either technical or reader services. They may specialize further in certain areas, such as science, business, the arts, or medicine. Their work may involve reviewing and abstracting published materials and preparing bibliographies in their specialty.

Librarians generally are classified according to the type of library in



Reference librarian helps student find information.

which they work: public libraries, school media centers, college and university libraries, and special libraries.

Public librarians serve all kinds of people—children, students, research workers, housewives, teachers, and others. Increasingly, public librarians are providing special materials and services to culturally and educationally deprived persons, and to persons who because of physical handicaps cannot use conventional print.

The professional staff of a large public library system may include the chief librarian, an assistant chief, and several division heads who plan and coordinate the work of the entire library system. The system also may include librarians who supervise branch libraries and specialists in certain areas of library work. The duties of some of these specialists are briefly described as follows:

Acquisition librarians purchase books and other materials and maintain a well-balanced library that meets the needs and interests of the

public. *Catalogers* classify these materials by subject and otherwise describe them to help users find what they are looking for. *Reference librarians* answer specific questions and suggest sources of information that may be useful.

Some librarians work with specific groups of readers. *Children's librarians* serve the special needs of young people by finding books they will enjoy and showing them how to use the library. They may plan and conduct special programs such as story hours or film programs. Their work in serving children often includes working with school and community organizations. *Adult services librarians* serve adults by suggesting materials suited to their needs and interests. They may cooperate in planning and conducting education programs, such as community development, public affairs, creative arts, problems of the aging, and home and family life. *Young adult services librarians* help junior and senior high school students select and use books and other materials.

They may organize programs of interest to young adults, such as book or film discussions or concerts of recorded popular and classical music. They also may coordinate the library's work with school programs. *Bookmobile librarians* offer library services to people not adequately served by a public library such as those in inner city neighborhoods, migrant camps, rural communities and institutions including hospitals and homes for the aged.

School media specialists instruct students in the use of the school library and help them choose from the media center's collection of print and non-print materials items that are related to their interests and to the subjects that they study in the classroom. Working with teachers and supervisors, school media specialists familiarize students with the library's resources. They prepare lists of materials on certain subjects and help select materials for school programs. They also select, order, and organize the library's materials. In some schools, media specialists may work with teachers to develop units of study and independent study programs, or they may participate in team teaching. Very large high schools may employ several media specialists, each responsible for a particular function of the library program or for a special subject area.

College and university librarians serve students, faculty members, and research workers in institutions of higher education. They may provide general reference service or may work in a particular subject field, such as law, medicine, economics, or music. Those working on university research projects operate documentation centers that use computers and other modern devices to record, store, and retrieve specialized information. College and university librarians may teach classes in the use of the library.

Special librarians work in libraries maintained by government agencies and by commercial and industrial firms, such as pharmaceutical companies, banks, advertising agencies, and research laboratories. They provide materials and services covering subjects of special interest to the organization. They build and arrange the organization's information resources to suit the needs of the library users. Special librarians assist users and may conduct literature searches, compile bibliographies, and in other ways provide information on a particular subject.

Others called *information science specialists*, like special librarians, work in technical libraries or information centers of commercial and industrial firms, government agencies and research centers. Although they perform many duties of special librarians, they must possess a more extensive technical and scientific background and a knowledge of new techniques for handling information. The information science specialist abstracts complicated information into short, readable form, and interprets and analyzes data for a highly specialized clientele. Among other duties, they develop classification systems, prepare coding and programming techniques for computerized information storage and retrieval systems, design information networks and develop microform technology.

Information on library technical assistants is found in a separate statement in the *Handbook*.

Places of Employment

Of the approximately 125,000 professional librarians in 1972, school librarians accounted for nearly one-half; public libraries and colleges and universities each employed

about one-fifth. An estimated one-seventh worked in special libraries, including libraries in government agencies. Some librarians worked in correctional institutions, hospitals, and State institutions, while a small number served as consultants, State and Federal Government administrators, and teachers and administrators in schools of library science. The Federal Government employed more than 3,500 professional library administrators.

More than 85 percent of all librarians are women. In college and university libraries, however, men make up about 35 percent of the total professional staff. Men also are relatively numerous in law libraries and in special libraries concerned with science and technology.

Most librarians work in cities and towns. Those attached to bookmobile units serve widely scattered population groups.

Training, Other Qualifications, and Advancement

A professional librarian ordinarily must complete a 1-year master's degree program in library science. A Ph.D. degree is an advantage to those who plan a teaching career in library schools or who aspire to a top administrative post, particularly in a college or university library or in a large library system. For those who are interested in the special libraries field, a master's degree or doctorate in the subject of the library's specialization is highly desirable.

In 1972, 49 library schools in the United States were accredited by the American Library Association and offered a master's degree in library science (M.L.S.). In addition, many other colleges offer graduate programs or courses within 4-year undergraduate programs.

Most graduate schools of library science require (1) graduation from

an accredited 4-year college or university. (2) a good undergraduate record, and (3) a reading knowledge of at least one foreign language. Some schools also require introductory undergraduate courses in library science. Most prefer a liberal arts background with a major in an area such as the social sciences, the arts, or literature. Some schools require entrance examinations.

Special librarians and information science specialists must have extensive knowledge of their subject matter as well as training in library science. In libraries devoted to scientific information, librarians should be proficient in one or more foreign languages. They also must be well informed about new equipment, methods, and techniques used in storing and recalling technical information.

Most States require that public school librarians be certified and trained both as teachers and librarians. The specific education and experience necessary for certification vary according to State and the school district. The local superintendent of schools and the State department of education can provide information about specific requirements in an area.

In the Federal Government, beginning positions require completion of a 4-year college course and a master's degree in library science, or demonstration of the equivalent in experience and education by passing an examination.

Many students attend library schools under cooperative work-study programs by combining the academic program with practical work experience in a library. Scholarships for training in library science are available under certain State and Federal programs and from library schools, as well as from a number of the large libraries and library associations. Loans, assist-

antships, and financial aids also are available.

Librarians should be intellectually curious and able to express themselves verbally, and should have the desire and ability to search out and help others use library materials.

Experienced librarians may advance to administrative positions or to specialized work. Promotion to these positions, however, is limited primarily to those who have completed graduate training in a library school, or to those who have specialized training.

Employment Outlook

The employment outlook for librarians is expected to be favorable through the mid-1980's. Although employment in the field is expected to grow over the period to 1985, the supply of persons qualified for librarianship is likely to expand rapidly as an increasing number of new graduates and labor force reentrants seek jobs as librarians.

The anticipated increase in demand for librarians in the 1970's and early 1980's will not be nearly as great as it was in the 1960's. Then, school enrollments were rising rapidly and Federal expenditures supported a variety of library programs.

Fewer births during the 1960's will result in a slight decline in elementary and secondary school enrollments through the remainder of the 1970's; an upturn in enrollments is expected thereafter. The effect of birth rates in the 1960's will begin to be manifested in colleges and universities in the early 1980's, when total degree-credit enrollment is expected to level off. In both the schools and the colleges and universities, as a result, the demand for librarians will increase at a slower pace than in the past.

On the other hand, requirements

for public librarians are expected to increase through 1985. The growth of an increasingly well-educated population will necessitate an increased number of librarians to serve the public. Also, the educationally disadvantaged, handicapped, and various minority groups will need qualified librarians to provide special services.

Employment of special librarians also will continue to grow. Because of ever-increasing demands upon high-level executives in business and industry, management will rely more heavily on special librarians and information specialists to keep abreast of new developments. Expanding use of computers to store and retrieve information will contribute to increased demand for information specialists and library automation specialists.

In addition to openings from growth, thousands of job openings for librarians will occur each year to replace those who retire, die, transfer to other types of work, or leave the labor force.

Although overall employment opportunities are favorable, some librarians may have to compete for jobs of their choice. New graduates in commanding lower beginning salaries and in having more recent training may have an employment advantage over reentrants to the profession.

Employment opportunities will vary not only by type of library but also by the librarian's educational qualifications and area of specialization. Also, whether the librarian seeks a job in a large or small city, a suburb or town, or a rural area, and the region of the country in which a person wants to work will affect work employment prospects.

Earnings and Working Conditions

Salaries of librarians vary by type

of library, individual's qualifications, and the size and geographical location of the library.

Starting salaries of graduates of American Library Association accredited library school programs averaged \$9,248 a year in 1972, ranging from \$8,713 in public libraries to \$9,549, in school libraries. According to a recent survey, the average annual salary for special librarians was \$13,900 in 1973. For librarians in college and university libraries, average salaries in 1972-73 ranged from \$8,700 a year for librarians with limited experience working in private 4-year colleges to over \$13,000 for university librarians with more extensive experience. Salaries for library administrators ranged somewhat higher. Department heads in college libraries generally earned between \$10,000 and \$14,000 a year.

In the Federal Government, the entrance salary for librarians with a master's degree in library science was \$11,614 a year in early 1973.

The typical workweek for librarians is 5 days, ranging from 35 to 40 hours. The work schedule of public and college librarians may include some weekend and evening work. School librarians generally have the same workday schedule as classroom teachers. A 40-hour week during normal business hours is common for government and other special librarians.

The usual paid vacation after a year's service is 3 to 4 weeks. Vacations may be longer in school libraries, and somewhat shorter in those operated by business and industry. Many librarians are covered by sick leave; life, health, and accident insurance; and pension plans.

Sources of Additional Information

Additional information, particularly on accredited programs,

and scholarships or loans may be obtained from:

American Library Association, 50 East Huron St., Chicago, Ill. 60611.

For information on requirements of special librarians write to:

Special Libraries Association, 235 Park Ave., South, New York, N.Y. 10003.

Information on Federal assistance for library training under the Higher Education Act of 1965 is available from:

Division of Library and Educational Facilities, Bureau of Libraries and Learning Resources, Office of Education, U.S. Department of Health, Education, and Welfare, Washington, D.C. 20202.

Those interested in a career in Federal Libraries should write to:

Secretariat Federal Library Committee, Room 310, Library of Congress, Washington, D.C. 20540.

Information on information science specialists may be obtained from:

American Society for Information Science, 1140 Connecticut Ave. NW., Washington, D.C. 20036.

Individual State library agencies can furnish information on scholarships available through their offices, on requirements for certification, and general information about career prospects in their regions. State boards of education can furnish information on certification requirements and job opportunities for school librarians.

SALES OCCUPATIONS

Sales work offers career opportunities for people who have completed high school as well as for college graduates, for those who want to travel and for those who do not, and for salaried workers as well as for men and women who wish to run their own businesses.

Workers in these jobs may sell for manufacturers, service firms, wholesalers, or retailers. In 1972 about 5.4 million people were in sales occupations; about 25 percent worked part time. Forty percent were women who worked mainly in retail stores. Most salesworkers outside of retail stores were men.

Training, Other Qualifications, and Advancement

Training requirements for sales work are as varied as the work itself. Salesworkers who sell standardized merchandise such as magazines, candy, cigarettes, and cosmetics usually are trained on the job by experienced salesclerks; in some large stores, they may attend brief training courses. The salesworker who sells complex products or services, such as electronic equipment or liability insurance, needs more education and training than most retail salesclerks. For some positions, salesworkers must be college graduates with majors in a field such as engineering. Others get the necessary technical knowledge from university or manufacturers' courses. Still others learn through years of on-the-job experience, often supplemented by home study. Thus, a real estate agent may take university extension courses; a department store beauty counselor may participate in an industry-sponsored training program; or a jewelry salesworker may learn

through years of observation and study on the job.

Salesworkers must understand the needs and viewpoints of their customers and be poised and at ease with strangers. Other important attributes for selling are energy, self-confidence, imagination, self-discipline, and the ability to communicate. Arithmetic skills are an asset. In almost all sales work except retail trade, salesworkers need initiative to locate prospective customers and to plan work schedules. Four sales occupations in which college graduates are increasingly employed are discussed in this section.

INSURANCE AGENTS AND BROKERS

(D.O.T. 250.258)

Nature of the Work

Insurance agents and brokers sell policies that protect individuals and businesses against future losses and financial pressures. They may help plan financial protection to meet the special needs of a customer's family; advise about insurance protection for an automobile, home, business, or other property; or help a policyholder obtain settlement of an insurance claim.

Agents and brokers usually sell one or more of the three basic types of insurance: life, property/liability, and health. Life insurance policies pay survivors when a policyholder dies; they also may provide retirement income, funds for the education of children, and other benefits. Property/liability insurance protects policyholders from financial losses as a result of automobile acci-

dents, fire and theft, or other hazards. Health insurance policies offer protection against the costs of hospital and medical care or loss of income due to illness or injury. Many agents also offer securities, such as mutual fund shares.

An insurance agent may be either an insurance company salesworker or an independent business person authorized to represent one or more insurance companies. Brokers, on the other hand, are not under contract with any company; they place policies directly with the company that best meets a client's needs. Otherwise, agents and brokers do much the same kind of work.

Agents and brokers spend most of their time discussing insurance policies with prospective and existing customers. Some time must be spent in office work to prepare reports, maintain records, plan insurance programs that are tailored to prospects' needs, and draw up lists of prospective customers. Specialists in group policies may help an employer's accountants set up a system of payroll deductions for employees covered by the policy.

Places of Employment

About 385,000 agents and brokers—90 percent of them men—sold insurance full time in 1972. Many others worked part time. About half specialized in life insurance; the rest, in some type of property/liability insurance. Almost all also sold health insurance.

Agents and brokers are employed in cities and towns throughout the country, but most work near large population centers.

Training, Other Qualifications, and Advancement

Although some employers prefer



Agent discusses policy with customer.

college graduates for jobs selling insurance, most hire high school graduates with work experience. College training may help the agent grasp the fundamentals and procedures of insurance selling more quickly. Courses in accounting, economics, finance, business law, and insurance subjects are helpful.

All agents and most brokers must be licensed in the States where they plan to sell insurance. In most States, licenses are issued only to applicants who pass written examinations covering insurance fundamentals and the State insurance laws. New agents usually receive training at insurance company home offices or at the agencies where they will work. Beginners sometimes attend company-sponsored classes to prepare for examinations. Others study on their own and accompany experienced salesworkers when they call on prospective clients.

Agents and brokers can broaden their knowledge of the insurance business by taking courses at colleges

and universities and attending institutes, conferences, and seminars sponsored by insurance organizations. The Life Underwriter Training Council (LUTC) awards a diploma in life insurance marketing to agents who successfully complete the Council's 2-year life program. They also offer other courses in life and health insurance. As an agent or broker gains experience and knowledge, he can qualify for the Chartered Life Underwriter (CLU) designation by passing a series of examinations given by the American Society of Chartered Life Underwriters. In much the same way, a property/liability agent can qualify for the Chartered Property Casualty Underwriter (CPCU) designation by passing an examination given by the American Institute for Property and Liability Underwriters, Inc. The CLU and CPCU designations are recognized marks of achievement in their respective fields.

Agents and brokers should be enthusiastic, self-confident, and able

to communicate effectively with different types of people. Because agents usually work without supervision, they need initiative to locate new prospects. For this reason, many employers seek people who have been successful in other jobs.

Insurance agents who show unusual sales ability and leadership may be promoted to sales manager in a district office or to a managerial job in a home office. A few agents may advance to top positions as agency superintendents or company vice-presidents. Many who have built up a good clientele prefer to remain in sales work. Some, particularly in the property/liability field, eventually establish their own independent agencies or brokerage firms.

Employment Outlook

Employment of insurance agents and brokers is expected to grow moderately through the mid-1980's as the volume of insurance sales continues to expand. Many additional jobs will open as agents and brokers die, retire, or leave their jobs to seek other work. Due to the competitive nature of insurance selling, beginners often leave their jobs because they have been unable to establish a successful clientele.

As personal incomes rise and life expectancy increases, more families will depend on life insurance for educational funds for their children and retirement income. Expansion in industrial plant and equipment and a growing number of major consumer purchases, such as homes or automobiles, will stimulate sales of property/liability insurance. Rising medical costs will increase sales of health insurance.

Employment of agents and brokers, however, is not expected to keep pace with growing insurance sales because more policies will be sold to groups and by mail. Also,

agents should be able to handle more business as computers relieve them of time-consuming clerical tasks.

Earnings and Working Conditions

Beginners in this occupation often are guaranteed moderate salaries or advances on commissions while they are learning the business and building a clientele. Thereafter, most agents are paid a commission. The size of the commission depends on the type and amount of insurance sold, and whether the transaction is a new policy or a renewal. After a few years, an agent's commissions on new policies and renewals may range from \$8,000 to \$20,000 annually. A number of established and highly successful agents and brokers earn more than \$30,000 a year.

Agents and brokers generally pay their own automobile and traveling expenses. In addition, those who own and operate independent businesses must pay office rent, clerical salaries, and other operating expenses out of their earnings.

Although insurance agents usually are free to arrange their own hours of work, they often schedule appointments during evenings and weekends for the convenience of clients. Some agents work more than the customary 40 hours a week. (See the statement on the Insurance Industry for more information about work in life and property/liability companies.)

Sources of Additional Information

General occupational information about insurance agents and brokers may be obtained from the home office of many life and property/liability insurance companies. Information on State licensing requirements may be obtained from the depart-

ment of insurance at any State capital.

Information about a career as a life insurance agent also is available from:

Institute of Life Insurance, 227 Park Ave., New York, N.Y. 10017.

Life Insurance Agency Management Association, 170 Sigourney St., Hartford, Conn., 06105.

The National Association of Life Underwriters, 1922 F St., NW., Washington, D.C. 20006.

Information about sales training in life and health insurance is available from:

The Life Underwriter Training Council, 1922 F St. NW., Washington, D.C. 20006.

Information about property/liability agents and brokers can be obtained from:

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

National Association of Insurance Agents, Inc., 85 John St., New York, N.Y. 10038.

MANUFACTURERS' SALESWORKERS

(D.O.T. 260. through 289.458)

Nature of the Work

Practically all manufacturers—whether they make computers or can openers—employ salesworkers. Manufacturers' salesworkers sell mainly to other businesses—factories, railroads, banks, wholesalers, and retailers. They also sell to hospitals, schools, and other institutions.

Most manufacturers' salesworkers sell nontechnical products. They must be well informed about their firms' products and also about the special requirements of their customers. When salesworkers visit firms in their territory, they use an approach adapted to the particular line of merchandise. A salesworker who handles crackers or cookies, for example, emphasizes the wholesomeness, attractive packaging, and variety of these products. Sometimes salesworkers promote their products by displays in hotels and conferences with wholesalers and other customers.

Salesworkers who deal in highly technical products, such as electronic equipment, often are called sales engineers or industrial salesworkers. In addition to having a thorough knowledge of their firms' products, they must be able to help prospective buyers with technical problems. For example, they may try to determine the proper materials and equipment for a firm's manufacturing process. They then present this information to company officials and try to negotiate a sale. Often, sales engineers work with the research-and-development departments of their own companies to devise ways to adapt products to a customer's specialized needs. Salesworkers who handle technical products sometimes train their customers' employees in the operation and maintenance of new equipment, and make frequent return visits to be certain that it is giving the desired service.

Although manufacturers' salesworkers spend most of their time visting prospective customers, they also do paperwork including reports on sales prospects or customers' credit ratings. In addition, they must plan their work schedules, draw up lists of prospects, make appointments, handle some corre-



Manufacturer's salesworkers learn the advantages of new packaging materials.

spondence, and study literature relating to their products.

Places of Employment

Over 42,000 people—10 percent of them women—were manufacturers' salesworkers in 1972. About 25,000 were sales engineers. Some work out of home offices, often located at manufacturing plants. The majority, however, work out of branch offices, usually in big cities near prospective customers.

More salesworkers are employed by companies that produce food products than by any other industry. Large numbers also work in the printing and publishing, chemicals, fabricated metal products, and electrical and other machinery industries. The largest employers of sales engineers produce heavy machinery, transportation equipment, fabricated metal products, and profes-

sional and scientific instruments.

Training, Other Qualifications, and Advancement

Although high school graduates can be successful manufacturers' salesworkers, college graduates increasingly are preferred as trainees.

Manufacturers of nontechnical products often hire college graduates who have a degree in liberal arts or business administration. Some positions, however, require specialized training. Drug salesworkers usually need training at a college of pharmacy. Manufacturers of electrical equipment, heavy machinery, and some types of chemicals prefer to hire college-trained engineers or chemists. (Information on chemists, engineers, and other professionally-trained workers who may be employed as manufacturers'

salesmen is given elsewhere in the *Handbook*.)

Beginning salesworkers take specialized training before they start on the job. Some companies, especially those that manufacture complex technical products, have formal training programs that last 2 years or longer. In some of these programs, trainees rotate among jobs in several departments of the plant and office to learn all phases of production, installation, and distribution of the product. Other trainees take formal class instruction at the plant, followed by on-the-job training in a branch office under the supervision of field sales managers.

A pleasant personality and appearance, and the ability to meet and get along well with many types of people are important. Because salesworkers may have to walk or stand for long periods or carry product samples, physical stamina is necessary. As in most selling jobs, arithmetic skills are an asset.

Sales representatives who have good sales records and leadership ability may advance to sales supervisors, branch managers, or district managers. Those having managerial skill eventually may advance to sales manager or other executive positions; many top executive jobs in industry are filled by people who started as salesworkers.

Because of frequent contact with business people in other firms, salesworkers often transfer to better jobs. Some go into business for themselves as manufacturers' agents selling similar products of several manufacturers. Other experienced salesworkers find opportunities in advertising and marketing research.

Employment Outlook

The number of manufacturers' salesworkers is expected to rise moderately through the mid-1980's as a result of general economic

growth and the greater emphasis manufacturers will place on their sales activities. In addition to openings from growth, several thousand jobs will emerge annually as existing positions become vacant because of retirements or deaths. Still other vacancies will occur as salesworkers leave their jobs to enter other types of employment.

Among the factors expected to influence employment growth in the occupation are the expansion of markets for technical products and the resulting demand for trained salesworkers. In addition, the increased volume of business transacted with some customers—modern industrial complexes, chain stores, and large institutions of many kinds—will heighten competition among the manufacturers supplying these organizations and intensify the need for effective selling. Although they will fill thousands of sales jobs each year, manufacturers are expected to be selective in hiring. They will look for ambitious young people who are well trained and temperamentally suited for the job.

Earnings and Working Conditions

According to limited data, salaries for beginning salesworkers averaged about \$9,000 a year in 1972, exclusive of commissions and bonuses. The highest starting salaries generally were paid by manufacturers of electrical and electronic equipment, construction materials, hardware and tools, and scientific and precision instruments.

Some manufacturing concerns pay experienced salesworkers a straight commission, based on their dollar amount of sales; others pay a fixed salary. The majority, however, use a combination plan of salary and commission, salary and bonus, or salary-commission and bonus. Commissions vary according to the sales-

workers' efforts and ability, the commission rate, location of their sales territory, and the type of product sold. Bonus payments may depend on individual performance, that of all salesworkers in the group or district, or on the company's sales. Some firms pay annual bonuses; others offer bonuses as incentive payments on a quarterly or monthly basis. In 1972, many experienced salesworkers earned between \$16,000 and \$32,000 annually; some earned more. In general, the earnings of manufacturers' salesworkers are higher than the average for nonsupervisory workers in private industry, except farming.

Some manufacturers' salesworkers have large territories and do considerable traveling. Others usually work in the neighborhood of their "home base." When on business trips, salesworkers are reimbursed for expenses such as transportation and hotels. Some companies provide a car or pay a mileage allowance to salesworkers who use their own cars.

Manufacturers' salesworkers call at the time most convenient to customers and may have to travel at night or on weekends. Frequently, they spend evenings writing reports. However, some plan their schedules for time off when they want it. Most salesworkers who are not paid a straight commission receive 2 to 4 weeks' paid vacation, depending on their length of service. They usually share in company benefits, including life insurance, pensions, and hospital, surgical, and medical benefits.

Sources of Additional Information

For more information on the occupation of manufacturers' salesworker write:

Sales and Marketing Executives International, Student Education Division, 630 Third Ave., New York, N.Y. 10017.

REAL ESTATE SALESWORKERS AND BROKERS

(D.O.T. 250.358)

Nature of the Work

Real estate salesworkers and brokers represent property owners in selling or renting their properties. They are also called real estate agents or, if they are members of the National Association of Realtors,® "Realtors®."

Brokers are independent businessmen who not only sell real estate, but also sometimes rent and manage properties, make appraisals, and develop new building projects. In closing sales, brokers usually make arrangements for loans to finance the purchases, for title searches, and for meetings between buyers and sellers, when details of the transaction are agreed upon and the new owners take possession. Brokers must also manage their own offices, advertising properties, and handle other business operations. Some combine other work such as selling insurance or practicing law with their real estate business.

Salesworkers or agents work for brokers. They show and sell real estate, handle rental properties, and obtain "listings" (owner agreements to place properties for sale with the firm). Because obtaining listings is an important job duty, salesworkers may spend much time on the telephone exploring leads gathered from advertisements and personal contacts. They also answer inquiries about properties over the telephone.

A worker who sells real estate or

handles rental properties often must leave the office to call on prospects and drive them to inspect properties for sale. When a number of houses are for sale in a new development, the agent may operate from a model home.

Most real estate salesworkers and brokers sell residential property. A few, usually in large firms, specialize in commercial, industrial or other types of real estate. Each specialty requires knowledge of the particular type of property. For example, selling or leasing business property requires an understanding of leasing practices, business trends, and location needs; those who sell or lease industrial properties must know about transportation, utilities and labor supply. To sell residential properties

the agent must know the location of schools, churches, shopping facilities, and public transportation. Familiarity with tax rates and insurance is also important. The salesworker who is a broker's only employee may need some knowledge of all types of property.

Places of Employment

About 350,000 persons—60 percent of them men—were full-time real estate brokers and salesworkers in 1972. Many others sold real estate part time. The total number of men and women licensed to sell was about 1 million in 1972, according to the National Association of Real Estate License Law Officials.

Most real estate employees work

for small business establishments; a few, in urban areas, work for firms with large staffs. Brokers generally are self-employed. Real estate is sold in all areas but employment is concentrated in large urban areas and in smaller but rapidly growing communities.

Training, Other Qualifications, and Advancement

Real estate salesworkers and brokers must be licensed in every State and in the District of Columbia. All States require prospective agents to pass written tests. The examination—more comprehensive for brokers than for salesworkers—includes questions on basic real estate transactions and on laws affecting the sale of property. In more than 60 percent of the States, candidates for a broker's license must have a specified amount of experience in selling real estate or the equivalent in related experience or education (generally 1 to 3 years). State licenses usually can be renewed annually without reexamination.

Employers prefer applicants with at least a high school education. High school courses in selling, architectural drawing, business law, economics, and public speaking are helpful for those planning a career in real estate. Most agents have some college training and many are college graduates. College courses in real estate subjects as well as psychology, economics, finance, and business administration are an asset.

Young men and women interested in beginning jobs as real estate salesworkers often apply in their own communities, where their knowledge of local neighborhoods is an advantage. The beginner usually learns the practical aspects of the job under the direction of an experienced agent.

Many firms offer formal training programs for both beginners and ex-



Real estate salesworker points out features of condominium project.

perienced salesworkers. About 360 universities, colleges, and junior colleges offer courses in real estate. At some, a student can earn an associate's or bachelor's degree with a major in real estate; several offer advanced degrees. Many local real estate boards that are members of the National Association of Realtors® sponsor courses covering the fundamentals and legal aspects of the field. Advanced courses in appraisal, mortgage financing, and property development and management also are available through various National Association affiliates.

Characteristics important for success in selling real estate include a pleasant personality, honesty, and a neat appearance. Maturity, tact, and enthusiasm for the job are required in order to motivate prospective customers in this highly competitive field. Agents also should have a good memory for names and faces and business details such as prices and zoning regulations.

Trained and experienced salesworkers can advance in many large firms to sales or general managers. Licensed brokers may open their own offices. Training and experience in estimating property value can lead to work as a real estate appraiser, and people familiar with operating and maintaining rental properties may specialize in property management. Those who gain general experience in real estate, and a thorough knowledge of business conditions and property values in their localities, may enter mortgage financing or real estate counseling.

Employment Outlook

Employment of real estate salesworkers and brokers is expected to rise moderately through the mid-1980's as more salesworkers are needed to serve a growing population. In addition to opportunities

that result from growth, several thousand openings will occur each year as employees die, retire, or leave for other reasons. Replacement needs are relatively high in this occupation because agents are older, on the average, than workers in most other job fields; in addition, many beginners transfer to other work after a short time selling real estate.

Mature workers, including those transferring from other kinds of saleswork, are likely to find many job opportunities. The proportion of part-time real estate salesworkers may decline, as State licensing requirements change and agents need more specialized knowledge to handle real estate transactions.

The favorable outlook for employment in this field will stem partly from increased demand for new home purchases or rentals by the many young people born following World War II. Continued migration to metropolitan areas and urban renewal programs are among other factors which will contribute to a growing need for agents. Although this field is likely to remain highly competitive it should offer many career opportunities to people with an aptitude for selling.

Earnings and Working Conditions

Commissions on sales are the main source of earnings—very few real estate agents work for a salary. The rate of commission varies according to the type of property and its value; the percentage paid on the sale of farm and commercial properties or unimproved land usually is higher than that paid for selling a home.

Commissions may be divided among several employees of a real estate firm. The person who obtained the listing often receives a part when the property is sold; the broker who makes the sale either gets the

rest of the commission, or else shares it with the agent who handles the transaction. Although an agent's share varies greatly from one firm to another, often it is about half of the total amount received by the firm.

Many full-time real estate agents earn between \$12,000 and \$20,000 a year, according to the limited data available. Beginners usually earn less. Experienced real estate salesworkers may earn \$30,000 or more a year.

Income usually increases as an agent gains experience, but individual ability, economic conditions, and the type and location of the property also affect earnings. Salesworkers who are active in community organizations and local real estate boards can broaden their contacts and increase their earnings. A beginner's earnings often are irregular because a few weeks or even months may go by without a sale. Although some brokers allow a salesworker a drawing account against future earnings, this practice is not usual with new employees. The beginner, therefore, should have enough money to live on until commissions increase.

Brokers provide office space, but salesworkers generally furnish their own automobiles. Agents and brokers often work in the evenings and during weekends to suit the convenience of customers. Some firms, especially the large ones, furnish group life, health, and accident insurance.

Sources of Additional Information

The real estate commission or board located in each State capital can supply details on licensing requirements for real estate salesworkers and brokers in the State. Most local real estate organizations also have this information. Many States can furnish manuals helpful to applicants who are preparing for the

required written examinations.

More information about opportunities in real estate work, as well as a list of colleges and universities offering courses in this field, may be obtained by writing to:

National Association of Realtors®
Department of Education, 155
East Superior St., Chicago, Ill.
60611.

SECURITIES SALEWORKERS

(D.O.T. 251.258)

Nature of the Work

When investors buy or sell stocks, bonds, or shares in mutual funds, they call on securities salesworkers to put the "market machinery" into operation. Both the individual who invests a few hundred dollars and the large institution with millions to invest need such services. Often these workers are called *registered representatives*, *account executives*, or *customers' brokers*.

In initiating buy or sell transactions, securities salesworkers relay orders through their firms' offices to the floor of a securities exchange. When the trade takes place in the over-the-counter market instead, they send the order to the firm's trading department. In either case, the salesworker promptly notifies the customer of the completed transaction and the final price.

In addition, they provide many related services for their customers. They may explain to new investors the meaning of stock market terms and trading practices. For more experienced investors who may have a variety of holdings, they may give suggestions and advice on the purchase or sale of a particular security. Some individuals may prefer long-

term investments designed for either capital growth or income over the years; others might want to make short-term investments which seem likely to rise in price quickly. Securities salesworkers furnish information about the advantages and disadvantages of each type of investment based on each person's objectives. They also supply the latest stock and bond quotations on any security in which the investor is interested, as well as information on the activities and financial positions of the corporations these securities represent.

Securities salesworkers may serve all types of customers or they may specialize in one type only, such as institutional investors. They also may specialize in handling only cer-

tain kinds of securities such as mutual funds. Some handle the sale of "new issues", such as corporation securities issued for plant expansion funds.

Beginning securities salesworkers spend much of their time searching for customers. Once they have established a clientele, however, they put more effort into servicing existing accounts and less into seeking new ones.

Places of Employment

About 220,000 persons—90 percent of them men—sold securities in 1972. Half worked full time in securities firms and in selling mutual funds. The rest include insurance salespersons offering securities to



Salesworkers discuss new stock offering.

their customers, and part-time mutual fund representatives.

Securities salesworkers are employed by brokerage firms, investment bankers, mutual funds, and insurance companies in all parts of the country. Many of these firms are very small. Most salesworkers, however, work for a small number of large firms with main offices in big cities (especially in New York) or for the nearly 7,000 branch offices in other areas.

Training, Other Qualifications, and Advancement

Because a securities salesworker must be well informed about economic conditions and trends, a college education is increasingly important, especially in the larger securities firms. This is not true, however, for part-time work selling mutual funds. Although employers seldom require specialized training, courses in business administration, economics, and finance are helpful.

Almost all States require persons who sell securities to be licensed. State licensing requirements may include passing an examination and furnishing a personal bond. In addition, salesworkers usually must register as representatives of their firms according to regulations of the securities exchanges where they do business or the National Association of Securities Dealers, Inc. (NASD). Before beginners can qualify as registered representatives, they must pass the Securities and Exchange Commission's (SEC's) General Securities Examination, or examinations prepared by the exchanges or the NASD. These tests measure the prospective representative's knowledge of the securities business. Character investigations also are required.

Most employers provide training to help salesworkers meet the re-

quirements for registration. In member firms of all major exchanges the training period is at least six months. Trainees in large firms may receive classroom instruction in security analysis and effective speaking, take courses offered by schools of business and other institutions and associations, and undergo a period of on-the-job training. In small firms, and in mutual funds and insurance companies, training programs may be brief and informal. Beginners read assigned materials and watch other salesworkers transact business.

Many employers consider personality traits as important as academic training. Employers seek applicants who are well groomed, able to motivate people, and ambitious. Because maturity and the ability to work independently also are important, many employers prefer to hire those who have achieved success in other jobs. Successful sales or managerial experience is very helpful to an applicant.

The principal form of advancement for securities salesworkers is an increase in the number and the size of the accounts they handle. Although beginners usually service the accounts of individual investors, eventually they may handle very large accounts such as those of corporations. Some experienced salesworkers advance to positions as branch office managers, who supervise the work of other salesworkers while executing "buy" and "sell" orders for their own customers. A few representatives may become partners in their firms or do other administrative work.

Employment Outlook

The number of securities salesworkers is expected to grow moderately through the mid-1980's as securities investments continue to increase. In addition to jobs result-

ing from growth, many salesworkers will be needed to replace those who die, retire, or transfer to other jobs. Because of the competitive nature of the occupation, many leave their jobs, unable to establish a successful clientele.

Employment of securities salesworkers will expand as economic growth and rising personal incomes increase the funds available for investment. The activities of investment clubs, which enable small investors to make minimum monthly payments toward the purchase of securities, also will contribute to the demand for securities salesworkers. Growth in the number of institutional investors will be particularly strong as more people purchase insurance; participate in pension plans; contribute to the endowment funds of colleges and other nonprofit institutions; and deposit their savings in banks. In addition, more workers will be needed to sell securities issued by new and expanding corporations and by State and local governments financing public improvements.

Earnings and Working Conditions

Trainees usually are paid a salary until they meet licensing and registration requirements. After registration, a few firms continue to pay a salary until the new representative's commissions increase to a stated amount. The salaries paid during training usually range from \$500 to \$700 a month; those working for large securities firms may receive as much as \$850 a month.

After candidates are licensed and registered, their earnings depend on commissions from the sale and purchase of securities for customers. Commission earnings are likely to be high when there is much buying and selling, and lower when there is a

slump in market activity. Most firms provide salesworkers with a steady income by paying a "draw against commission"—that is, a minimum salary based on the commissions which they can be expected to earn. A few firms pay salesworkers only salary and bonuses, that usually are determined by the volume of company business.

Earnings of full-time, experienced securities salesworkers averaged \$21,000 a year in 1972, according to the limited data available. Some earned more than \$30,000 a year.

Full-time securities salesworkers earn about three times as much as average earnings for nonsupervisory workers in private industry, except farming.

Securities salesworkers usually work in offices where there is much activity. In large offices, for example, rows of salesworkers sit at desks in front of "quote boards" which continually flash information on the prices of securities transactions.

Although established salesworkers usually work the same hours as others in the business community,

beginners who are seeking customers may work longer. Some salesworkers accommodate customers by meeting with them in the evenings or on weekends.

Sources of Additional Information

Further information concerning a career as a securities salesworker may be obtained from the personnel departments of individual securities firms.

OCCUPATIONS IN TRANSPORTATION ACTIVITIES

Transportation offers a wide range of career opportunities. Jobs in air, rail, highway, and water transportation require many workers who have at least a college degree.

Although this field has many kinds of jobs, most employees drive trucks and buses, fly airliners, operate trains and ships, and keep this equipment in good working condition. Others, such as air traffic controllers and airline dispatchers, perform related jobs that enable the transportation industry to serve millions of Americans annually.

As the economy expands and population grows, demand for freight and passenger service will rise, and more transportation workers will be hired. Employment trends, however, will vary by type of business. Employment in most air and highway transportation jobs will increase, while employment in the merchant marine and the railroads will decline. Even in declining occupations, however, new workers will be hired to replace those who retire, die, or transfer to other fields.

Transportation offers excellent opportunities for persons with a college education. Working conditions are generally good and the pay is fairly high. Many employees do a lot of traveling on the job and meet new and interesting people.

AIR TRAFFIC CONTROLLERS

(D.O.T. 193.168)

Nature of the Work

Air traffic controllers are the guardians of the airways. They coordinate flights to prevent accidents and minimize delays in takeoffs and landings. Some regulate airport traffic; others regulate flights between airports.

Airport traffic controllers work in a tower near the runway to keep track of planes that are on the ground and in the air nearby. They radio pilots to give them permission to taxi, take off, or land. To assure safe conditions, they must consider many factors including weather, and the number, size, and speed of the planes in the area. They also must keep track of positions of planes both on the ground

and in the air to control several aircraft simultaneously.

After a plane takes off, airport controllers notify air route controllers to take charge. Route controllers communicate with pilots by radio and use radar and other electronic equipment to help keep planes on course. They also warn pilots about nearby planes and other possible hazards. Each route controller is assigned a certain amount of airspace. One, for example, might be responsible for all planes that are 30 to 100 miles north of the airport and flying between 6,000 and 18,000 feet. As the flight progresses, one air route controller after another takes charge until the planes have safely arrived at their destinations and airport traffic controllers are again in charge.

Places of Employment

Almost all of the 20,000 air traffic controllers who worked for the Federal Aviation Administration



Traffic controllers identify airplanes by radar.

(FAA) in 1972 were men. Almost all worked at major airports and air route traffic control centers located near large cities. A few were assigned to control towers and centers outside the United States.

Training, Other Qualifications, and Advancement

Air traffic controller trainees are selected through the competitive Federal Civil Service System. Applicants must be less than 31 years old and must pass a written test that measures their ability to learn and perform controller's duties. In addition, applicants must have 3 years of progressively responsible work experience that demonstrates potential for learning and performing air traffic control work, or four years of college or a combination of both. Applicants must be in excellent health, have vision correctable to 20/20, and must be able to speak clearly and precisely.

Successful applicants receive a combination of on-the-job and formal training to learn the fundamentals of the airway system, Federal aviation regulations, controller equipment, and aircraft performance characteristics. All receive intensive training in simulators at the FAA Academy in Oklahoma City. It usually takes two to three years to become a fully-qualified controller. Each year controllers must pass a physical and twice a year must pass a job performance examination.

Controllers can transfer to jobs at different locations and advance to the job of chief controller. Some advance to more responsible management jobs in air traffic control and a few to top administrative jobs in the FAA.

Employment Outlook

Employment of air traffic con-

trollers is expected to increase rapidly through the mid-1980's. In addition to jobs that result from growth, many openings will arise as experienced controllers retire, die or transfer to other jobs.

As the number of aircraft increases, the skyways will become more congested. To prevent collisions, the FAA has created spaces, near certain airports and above certain altitudes which require all pilots to receive directions from air traffic controllers. If, as expected, the number and size of these spaces are expanded, more controllers will be needed despite the greater use of new, automated control equipment.

Under the provisions of a new labor contract, controllers may now retire with a pension after working 20 years. Many eligible employees are expected to retire over the next few years and create an unusually large number of openings. However, because the number of applicants is large, competition is expected to be severe.

Earnings and Working Conditions

In 1972, experienced air traffic controllers earned between \$14,000 and \$19,700 a year. Depending on length of service, they receive 13 to 26 days of paid vacation and 13 days of paid sick leave each year, life insurance, health benefits, and a more liberal retirement program than other Federal employees.

Controllers work a basic 40-hour week; however, they may work additional hours, for which they receive overtime pay or equal time off. Because control towers and centers must be operated 24 hours a day, 7 days a week, controllers are assigned to night shifts on a rotating basis.

Air traffic controllers work under great stress. They must keep track of several planes at the same

time and make certain all pilots receive correct instructions.

Many controllers belong to the Professional Air Traffic Controllers Organization.

Sources of Additional Information

A pamphlet providing general information about controllers is available from any U.S. Civil Service Commission office. Addresses of these offices are available at all post offices.

Inquiries about job opportunities should be addressed to the personnel department of the nearest FAA regional office. Addresses of regional offices are available from:

Personnel Operations Division, Federal Aviation Administration, 800 Independence Ave. SW., Washington, D.C. 20591.

AIRLINE DISPATCHERS

(D.O.T. 912.168)

Nature of the Work and Places of Employment

Dispatchers (sometimes called flight superintendents) are employed by the airlines to coordinate airline flight schedules and to make sure that all regulations of the Federal Aviation Administration (FAA) and the airline company are observed. After checking on weather conditions, the dispatcher makes a preliminary decision as to whether a flight can leave safely and on time. If any change takes place from the scheduled departure time, the dispatcher must arrange for the passengers and crew to be notified.

In preparing for the flight, the dispatcher confers with the captain

about the quantity of fuel the plane needs, the best route and altitude for its flight, and the alternate airports that may be used if bad weather prevents landing at the scheduled airport. The dispatcher and the captain must agree on all details of the flight before the plane is allowed to leave the airport. In some instances, the dispatcher also keeps records of matters involving the company, such as the availability of aircraft and equipment, the weight of cargo, the amount of time flown by each aircraft, and the number of hours flown by each crew member.

In 1972, airlines employed about 800 dispatchers and assistants. Most of them worked at large airports near metropolitan areas.

Training, Other Qualifications, and Advancement

Dispatchers are selected from employees having 5 to 10 years general experience with the company. They are required to have an FAA dispatcher certificate. To qualify, an applicant has to work at least a year under the supervision of a certified dispatcher or complete an FAA-approved dispatcher's course at a school or an airline training center. Applicants who do not have this schooling or experience may qualify if they have spent 2 of the previous 3 years in air traffic control work, or in airline jobs such as dispatch clerk, assistant dispatcher, or radio operator, or in similar work in military service.

Applicants for an FAA dispatcher certificate must pass a written examination on subjects such as Federal aviation regulations, weather analysis, air-navigation facilities, radio procedures, and airport and airway traffic procedures. In an oral test, they also have to demonstrate ability to interpret weather maps

and information, and familiarity with airline routes and navigational facilities. They must know all operating weight limitations, landing and cruising speeds, and other aircraft characteristics. Licensed dispatchers are checked periodically by their employers to make sure that they maintain the skills required by Federal regulations and the company. Airlines give qualified dispatchers additional training to keep them up to date on new flight procedures and the characteristics of new aircraft.

For assistant dispatcher jobs, which may not require certification, airlines seek persons who have at least 2 years of college or who have worked an equivalent amount of time in some phase of air transportation, such as the dispatch clerks in ground operations. Preference is given to college graduates who have had courses in mathematics, physics, and related subjects. Some experience in flying, meteorology, or business administration also is helpful.

Employment Outlook

The number of workers in this very small occupation is not expected to change much through the mid-1980's. Most openings for new workers will develop as experienced dispatchers and their assistants retire, die, or transfer to other occupations.

The need for some additional dispatchers will result from the increase in air traffic, the addition and extension of routes, and the extra difficulties in launching jet aircraft. However, these factors will be largely offset by improved communication facilities and related computer technology which allow dispatchers at major terminals to dispatch aircraft at other airports and over large geographic areas.

Earnings and Working Conditions

Beginning dispatchers earned between \$1,000 to \$1,200 a month in 1972. As a rule, dispatchers and their immediate families are entitled to a limited amount of free transportation or reduced fares on their companies' flights. In addition, they may fly at greatly reduced rates with other airlines. Dispatchers usually receive from 2 to 4 weeks of vacation with pay, depending on length of service. They also receive paid sick leave, life and health insurance, and retirement benefits.

Most dispatchers are represented by the Transport Workers Union of America and the International Association of Machinists and Aerospace Workers.

Sources of Additional Information

Information about job opportunities in a particular airline and the qualifications required may be obtained by writing to the personnel manager of the company. Addresses of companies are available from:

Air Transport Association of America,
1000 Connecticut Ave. NW., Wash-
ington, D.C. 20036.

FLIGHT ENGINEERS

(D.O.T. 621.281)

Nature of the Work

Flight engineers are members of flight crews who make sure the mechanical and electrical devices aboard airplanes work properly. After attending a general briefing with the pilot and copilot to obtain weather information and other de-

tails about the flight, they check maintenance records and may check the tires and other outside parts of the plane. If any faulty equipment is located, a mechanic is called to make repairs.

From their station in the cockpit, flight engineers assist the pilot and copilot in making preflight checks of instruments and equipment. They make sure each fuel tank has been filled, adjust the electrical power, and check the engine instruments. After take off, flight engineers watch instruments and operate controls to regulate the performance of the engines, air conditioning, and other equipment. They also keep records of engine performance and fuel consumption. They report any mechanical problems to the pilot, and if possible, make emergency repairs in flight. At the few airports where there are no mechanics, flight engineers may make minor repairs, and those employed by smaller airlines may assist in refueling.

Places of Employment

About 7,000 flight engineers were employed in 1972. The Federal Aviation Administration requires flight engineers to be on most three- and four-engine aircraft and some two-engine jet aircraft. As a result, most engineers work for airlines and are stationed in major cities at the airlines' main bases.

Training, Other Qualifications, and Advancement

Most scheduled airlines now require applicants for flight engineers positions to have a commercial pilot's license. This license requires skill, training and experience as a pilot. (See the statement on pilots and copilots elsewhere in the *Handbook*.)

Before applicants can fly as crew members, they also must have a flight engineer's license from the Federal Aviation Administration. They can qualify for a flight engineer's license if they have had 3 years of experience in repairing or overhauling aircraft and engines or experience as a pilot or flight engineer in the Armed Forces. In addition, applicants must pass a rigid physical examination and a written test on flight theory and engine operation. They also must pass a flight check of operating procedures for the type of plane they will be assigned. Completing a private course of ground and flight instruction which is approved by the Federal Aviation Administration is the most common method of qualifying for a license.

Airlines generally prefer applicants who are 21 or 35 years of age, from 5 feet 6 inches to 6 feet 4 inches tall, and in excellent physical condition. They must be able to cope with the pressures and responsibilities that are part of the occupation, and must be able to work as part of a team. Good eyesight, including normal color vision, is essential. All airlines require a high school education, and they prefer at least 2 years of college.

Although airlines favor applicants who already have a flight engineer's license and a commercial pilot's license, they may train those who have only the pilot's license.

Advancement opportunities usually depend on qualifications and seniority provisions established by union contracts. The flight engineer who has pilot qualifications, generally called the second officer, advances on the basis of seniority to copilot, and then follows the regular line of advancement open to other copilots. Flight engineers who do not have pilot qualifications can select more desirable routes and schedules as they gain seniority.

Employment Outlook

Employment is expected to increase rapidly through the mid-1980's. In addition, several hundred openings will occur each year as experienced flight engineers transfer to jobs as copilots, retire, or die. Assuming no significant continued fuel shortages, growth in airline traffic will create a need for more airplanes and more engineers.

Earnings and Working Conditions

Monthly earnings of beginning flight engineers ranged from \$650 to \$690 in 1972, according to information from several union contracts. Monthly earnings of experienced flight engineers ranged from \$2,000 to \$3,000. Earnings depend on size, speed, and type of plane; hours and miles flown; length of service; and the type of flight (such as night or international).

As a rule, flight engineers and their immediate families are entitled to a limited amount of free or reduced fare transportation on their company's flights. In addition, they may travel on other airlines at greatly reduced rates. Engineers may be away from their home bases about one-third of the time or more. When they are away from home, the airlines provide living accommodations and an allowance for expenses. Airlines operate flights at all hours of the day and night, so engineers often have irregular work schedules.

Flight engineers usually receive 2 to 4 weeks of vacation with pay. They also receive paid sick leave, life and health insurance, and retirement benefits.

Flight engineers who are qualified pilots (Second Officers) are represented by the Air Line Pilots Association, International. Most others belong to the Flight Engineers' Inter-

national Association or to the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America.

Sources of Additional Information

Career information and a list of schools offering flight engineer training are available from:

Flight Engineers' International Association, 905 16th St. NW., Washington, D.C. 20006.

Information about job opportunities in a particular airline and the qualifications required may be obtained by writing to the personnel manager of the company. Addresses of airline companies and details on physical and educational qualifications for flight engineers may be obtained from:

Air Line Pilots Association, International, 1625 Massachusetts Ave. NW., Washington, D.C. 20036.



Both captain and copilot must do great deal of planning before taking off. They confer with the company weatherman and, in cooperation with the airline dispatcher, choose a route, speed, and altitude that will give a safe, smooth flight. The captain then coordinates the route with air traffic control personnel.

Before takeoff, the captain and copilot "preflight" the airplane, checking the engines, controls, instruments, and other components to make sure everything is working properly. During the flight, they radio to ground control stations to report their plane's altitude, air speed, weather conditions, and other flight details. The captain steers the plane to each point on the flight plan and changes altitude and speed as necessary. The captain and the copilot watch instruments that indicate the amount of fuel and condition of the engines, and provide navigation information. If visibility is poor during the landing approach, they may rely on instruments such as the altimeter, and air speed and course indicators. After parking the plane, they go to the airline office and complete flight records required by the company.

Some specially trained airline pilots are evaluators. They fly with each pilot at least twice a year to make sure Federal Aviation Administration (FAA) and company regulations are obeyed. Another group teaches pilots and copilots to fly new airplanes.

Although pilots employed by businesses usually fly smaller planes than airline pilots, their preflight and flight duties are much alike. These pilots, however, usually are not assisted by flight crews, and may perform minor maintenance and repair work on their planes.

PILOTS AND COPILOTS

(D.O.T. 196.168, .228, .268, and .283)

Nature of the Work

Pilots and copilots are skilled, highly trained professionals who have been carefully selected for their ability to fly safely. They transport passengers and cargo and perform other tasks such as crop dusting and inspecting power lines. The pilot (called captain by the airlines) is in charge of the plane, and supervises all other crew members. The copilot assists the captain in air-to-ground communications, monitoring flight and engine instruments, and in operating the plane's controls.

Places of Employment

About 54,000 civilian pilots and copilots worked full-time in 1972. About 50 percent worked for large airline companies and most were stationed near large cities where major airports are located. Most of the remainder trained student pilots or worked for large corporations that use their own airplanes to transport company executives. Others performed a variety of services for many different employers throughout the country. Some flew air taxis or crop dusting planes. A small

number inspected pipelines or provided sightseeing trips. Federal, State, and local governments also employed pilots and copilots.

Training, Other Qualifications, and Advancement

Commercial pilots and copilots must be licensed by the Federal Aviation Administration (FAA). All must have a commercial airplane pilot's license, and airline captains also must have an airline transport pilot's license. All pilots and copilots also must have a rating for the class of plane they can fly (single-engine, multi-engine, or seaplane), and for the specific type of planes, such as DC-9 or Boeing 747. In addition, airline pilots and copilots and others who fly in bad weather must have an instrument rating.

To qualify for the commercial pilot's license, applicants must be at least 18 years old and have at least 200 hours of flight experience. For an instrument rating, applicants must practice instrument flying for at least 40 hours. Applicants for an airline transport pilot's license must be at least 23 years old and have a minimum of 1,500 hours of flight time during the previous 8 years, including night and instrument flying.

Before pilots may receive any license they must pass a strict physical examination and a written test covering subjects such as principles of safe flight, navigation techniques, and FAA regulations. They also must submit proof that they have completed the minimum flight time requirements and, in a practical test, demonstrate their ability to fly a plane. The license remains in effect as long as the pilot can pass an annual physical examination and the periodic tests of flying skills required by Government regulation.

However, pilots may not fly an airliner after age 60.

A young person may learn to fly in the military or in civilian flying schools. Either kind of training satisfies the flight experience requirements for licensing. Graduates of private schools must pass a FAA flight check in a plane of their choice and a written examination on FAA regulations. Applicants who have appropriate military training and experience are required only to pass a written examination and physical examination if they apply for a license within a year after leaving the service. Those trained in the armed services have had the added opportunity to gain experience on large aircraft similar to airliners.

As a rule, applicants for a copilot job with the airlines must be between 20 and 35 years old. They must be 5 feet 6 inches to 6 feet 4 inches tall and weigh between 140 and 210 pounds. All applicants must be high school graduates; most airlines require 2 years of college and prefer to hire college graduates. Physical requirements for pilots, especially in scheduled airlines, are very high. They must have corrected vision of 20/20, good hearing, and no physical handicaps that prevent quick reactions. The airlines use psychological tests to determine an applicant's ability to make quick decisions and accurate judgements under pressure.

Applicants hired by the scheduled airline companies usually start as flight engineers, although they may begin as copilots. An applicant for a job with an airline often must have more than the FAA minimum qualifications for a commercial pilot's license. For example, airlines generally require 500 to 1,000 hours of flight experience, whereas only 200 hours are needed for the commercial license.

All newly hired airline copilots

go through company orientation courses. Trainees receive classroom instruction on subjects such as flight theory, and weather as well as FAA and company regulations. In addition, some airlines give beginning copilots or flight engineers from 3 to 10 weeks of flight training in classrooms and simulators and on company planes before assigning them to a scheduled flight.

Beginning copilots generally have limited responsibilities, such as operating the flight controls in good weather over a route that is easy to navigate. As they gain experience and skill, they handle progressively more complex assignments. Copilots who have enough skill and experience and have passed the test for an airline transport pilot's license, can advance to captain. A minimum of 2 or 3 years' service is required for promotion but, in actual practice, advancement to captain takes 5 to 10 years or longer.

Employment Outlook

A very rapid rise in the employment of pilots and copilots is expected through the mid-1980's. In addition to jobs that result from employment growth, several thousand openings will arise as experienced pilots and copilots retire, die, or change occupations.

Assuming no significant continued fuel shortage, growth in airline traffic will create a need for more airplanes and more pilots and copilots to fly them. Employment in business flying also is expected to increase as the Nation's economy expands.

Earnings and Working Conditions

Pilots and copilots are among the highest wage earners in the Nation. In 1970, those who worked full time averaged \$17,206 a year,

more than double the average for male workers as a whole. Pilots and copilots for airlines earn more than those employed by business and government. In 1972, a union contract with a major airline indicated that copilots earned from \$17,500 to \$40,000 a year, and pilots from \$37,000 to \$60,000.

Earnings depend on factors such as the type, size, and speed of the planes, and the number of hours and miles flown. Airline-captains and copilots who have at least 1 year of service are guaranteed minimum monthly earnings which are about four-fifths as much as the maximum they could possibly earn. Extra pay is given for night and international flights.

As a rule, airline pilots and their immediate families are entitled to a limited amount of free or reduced fare transportation on their companies' flights. In addition, they may travel at greatly reduced rates with other airlines. Airline pilots may be away from their home bases about one-third of the time or more. When they are away from home, the airlines provide living accommodations and an allowance for expenses.

Airlines operate flights at all hours of the day and night so work schedules are often irregular. Under the Federal Aviation Act, airline pilots and copilots cannot fly more than 85 hours a month. Most actually fly only about 60 hours a month, but their total duty hours, including layovers before return flights, usually exceed 100 hours a month.

Pilots and copilots employed by airlines usually receive 2 to 4 weeks of vacation with pay, depending on their length of service. They also receive paid sick leave, life and health insurance, and retirement benefits. Those who work for the Federal Government receive 13 to 26 days of paid vacation and 13

days of paid sick leave a year, as well as life and health insurance, and retirement benefits.

Although flying does not involve much physical effort, the pilot often is subject to stress and must be constantly alert and prepared to make decisions quickly.

Most airline pilots are members of the Air Line Pilots Association, International. Those employed by one major airline are members of the Allied Pilots Association.

Sources of Additional Information

Information about job opportunities in a particular airline and the qualifications required may be obtained by writing to the personnel manager of the company. Addresses of companies and details about physical and educational requirements for pilots may be obtained from:

Air Line Pilots Association, 1625 Massachusetts Ave. NW., Washington, D.C. 20036.

Inquiries about jobs with the Federal Aviation Administration should be addressed to the personnel department at the nearest FAA regional office. Addresses of the regional offices are available from:

Personnel Operations Division, Federal Aviation Administration, 800 Independence Ave. SW., Washington, D.C. 20591.

MERCHANT MARINE OFFICERS

Nature of the Work

In command of every ocean going vessel is the *captain* (D.O.T. 197.168)

or *master* who is the shipowner's sole representative. He has complete authority and responsibility for ship operation, including discipline and order, and the safety of the crew, passengers, cargo, and vessel.

While in port, the captain may serve as the shipowner's agent in conferring with custom officials, and in some cases, act as paymaster for the ship. Although not technically a member of a specific department, he generally is associated with the deck department, from whose ranks he has been promoted.

Deck Department. Deck officers or "mates" as they are traditionally called direct the navigation of the ship and the maintenance of the deck and hull. They maintain the authorized speed and course; plot the vessel's position at frequent intervals; post lookouts when required; record information in the "log" of the voyage; and immediately notify the captain of any unusual occurrences. Deck officers must be familiar with modern navigational devices, such as sonar and radio directional finders, to operate ships safely and efficiently.

The *chief mate* (D.O.T. 197.133), also known as the first mate or chief officer, is the captain's key assistant in assigning duties to the deck crew and maintaining order and discipline. He also plans and supervises the loading and unloading of cargo, and assists the captain in taking the ship in and out of port. On some ships the chief mate also may be in charge of first aid treatment.

By tradition, the *second mate* (D.O.T. 197.133) is the navigation officer. He sees that the ship is provided with the necessary navigation charts and that navigating equipment is maintained properly.

The *third mate* (D.O.T. 197.133), the most junior-rated deck officer, is responsible for the care and the maintenance of the navigating bridge



Chief mate directs speed and course of cargo ship.

and the chartroom. He acts as the signal officer and is in charge of all signaling equipment. He also assists in the supervision of cargo loading and unloading. The third mate frequently inspects lifesaving equipment to be sure it is ready for use in fire, shipwreck, or other emergencies.

Engine Department. Marine engineers operate and maintain all engines and machinery aboard ship. The *chief engineer* (D.O.T. 197.130) supervises the engine department, and is responsible for the efficient operation of engines and other mechanical equipment. He oversees the

operation of the main power plant and auxiliary equipment while the vessel is underway and keeps record of equipment performance and fuel consumption.

The *first assistant engineer* (D.O.T. 197.130) supervises engine room personnel and directs operations such as starting, stopping, and controlling the speed of the main engines. He oversees and inspects the lubrication of engines, pumps, generators, and other machinery, and with the aid of the chief engineer, directs all types of repairs.

The *second assistant engineer* (D.O.T. 197.130) has charge of the

boiler and associated equipment such as the water-feed system and pumps. He makes sure proper steam pressure and oil and water temperatures are maintained. He also supervises the cleaning of boilers.

The *third assistant engineer* (D.O.T. 197.130) supervises the operation and maintenance of the lubrication system and a variety of other engine room equipment. Some third assistant engineers are responsible for the electrical and refrigeration systems aboard ships.

Other officers. A ship keeps contact with the shore and other vessels through its *radio officer* (D.O.T. 193.282), who also maintains radio equipment. A passenger ship carries three to six radio officers; the average cargo vessel employs one. The officer sends and receives messages by voice or Morse code. He periodically receives and records time signals, weather reports, position reports, and other information. The radio officer also may maintain depth recording equipment and electronic navigation equipment.

Some freighters and all passenger vessels carry *pursers* (D.O.T. 197.168). The purser or staff officer does the extensive paperwork required to enter and clear a ship in each port, prepares payrolls, and assists passengers as required. In recent years, the Staff Officers Association has established a program to train pursers to act also as pharmacists' mates. This instruction is designed to improve the medical care aboard freighters and tankers and facilitate Public Health clearance when a ship arrives in port. All passenger ships must carry licensed doctors and nurses.

Places of Employment

Nearly 8,500 officers were employed aboard U.S. oceangoing vessels in late 1972. Deck officers

and engineering officers accounted for more than four-fifths of the total, and radio officers made up most of the remainder.

About 65 percent of the officers were aboard freighters and 32 percent were aboard tankers. The remaining 3 percent manned passenger vessels.

Training, Other Qualifications, and Advancement

People applying for an officer's license in the deck and engineering departments of oceangoing vessels must meet certain legal requirements. Captains, chief and second mates, and chief and first assistant engineers must be at least 21 years old. The minimum age for third mates, third assistant engineers, and radio operators is 19. In addition, applicants must present proof of U.S. citizenship and obtain a U.S. Public Health Service certificate attesting to their vision, color perception, and general physical condition.

In addition to legal and medical requirements, candidates must also have at least 3 years of appropriate sea experience or be a graduate of an approved training program. Deck officer candidates must pass Coast Guard examinations that require extensive knowledge of seamanship, navigation, cargo handling, and deck department operations. Marine engineering officer candidates must demonstrate in-depth knowledge of propulsion systems, electricity, plumbing and steam fitting, metal shaping and assembly, and ship structure. To advance to higher ratings, officers must pass progressively more difficult examinations.

For a Coast Guard license as a radio officer, applicants must have a first or second-class radiotelegraph operator's license issued by the Federal Communications Commission. For a license to serve as

the sole radio operator aboard a cargo vessel, the Coast Guard also requires 6 months of radio experience at sea.

Unlike most professions, no education requirements have been established for officers. A seaman with 3 year's experience in the deck or engine department may apply for either a third mate's license or for a third assistant engineer's license. However, because of the complex machinery, navigational, and electronic equipment on modern ships, formal training usually is needed to pass the Coast Guard's examination for these licenses.

The fastest and surest way to become a well-trained officer is through an established training program. Such programs are available at the U.S. Merchant Marine Academy at Kings Point, N.Y. and at five State merchant marine academies: California Maritime Academy, Vallejo, Calif.; Maine Maritime Academy, Castine, Maine; Massachusetts Maritime Academy, Hyanis, Mass.; Texas Maritime Academy, Galveston, Tex.; and New York Maritime College, Fort Schuyler, New York, N.Y. About 550 students graduate each year from these schools; about one-half are trained as deck officers and one-half as marine engineers. Entrance requirements are very high. Admission to the Federal academy is through nomination by a member of Congress, whereas entrance to the other academies is made through written application directly to the school.

Most of the academies offer 3- or 4-year courses in nautical science or marine engineering, as well as practical experience at sea. Subjects include navigation, mathematics, electronics, seamanship, propulsion systems, electrical engineering, languages, history, and shipping management. After Coast Guard examinations are passed, licenses

are issued for either third mate or third assistant engineer. In addition, graduates may receive commissions as ensigns in the U.S. Naval Reserve.

Because of their thorough grounding in theory and its practical application, academy graduates are in the best position to move up to master and chief engineer ratings. Their well-rounded education also helps qualify them for shoreside jobs such as marine superintendent, operating manager, or shipping executive.

A number of trade unions in the maritime industry provide officer training. These unions include the International Organization of Masters, Mates and Pilots; the Seafarers' International Union; the Brotherhood of Marine Officers; and the National Marine Engineers' Beneficial Association. Most union programs are designed to upgrade experienced seamen to officer ratings, although some programs accept inexperienced young men. For example, the National Marine Engineers' Beneficial Association (MEBA) operates the Calhoun MEBA Engineering School in Baltimore, Md., which offers high school graduates a 3-year apprenticeship training program in preparation for a third assistant engineer's license. The program consists of both classroom instruction and sea experience and provides free room, board, medical care, and text books in addition to a monthly grant. Trainees must agree to serve at least 3 years in the U.S. Merchant Marine after the 3-year training period.

The U.S. Merchant Marine Academy now selects 10 percent of the approximately 300 men who enter the academy each year to be trained as "omnicompetent" officers. They are taught both navigational and technical skills so they can work in either the deck or engine department.

Advancement for deck and engine officers is along well-defined lines and depends primarily upon specified sea experience, passing a Coast Guard examination, and leadership ability. Deck officers start as third mates. After 1 year's service they are eligible to take a second mate examination. A second mate may apply for a chief mate's license after 1 year of service, and a chief mate may apply for a captain's license after 1 year of service. An officer in the engine department starts as third assistant engineer. After 1 year of service, he may apply for a second assistant's license and finally a chief engineer's license.

Employment Outlook

Employment of ship's officers is expected to decline moderately through the mid-1980's. Some job openings will arise each year, however, due to the need to replace experienced officers who retire, die, or take shoreside employment.

The number of ships in our merchant fleet is not expected to increase in the years ahead (See introduction on merchant marine occupations). Older vessels will be replaced by larger, mechanized ships equipped with the latest labor-saving innovations. A central console in the newest ships, for example, controls engines, boilers, and related propulsion equipment, so the need for officers in charge of such equipment is reduced.

Earnings and Working Conditions

Earnings of officers depend upon their rank and the type of ship. Wages are highest on large ships. The accompanying tabulation shows monthly base wages for officers aboard an average freighter in 1972. Additional payments for overtime and assuming extra responsibilities

generally average about 50 percent of base pay. For example, a second mate with a monthly base pay of \$955 may regularly earn about \$1,433 each month.

	<i>Base pay¹</i>
Captain	\$2,443
First mate	1,347
Second mate	955
Third mate	858
Radio officer	1,056
Purser	772
Chief engineer	2,253
First assistant engineer	1,347
Second assistant engineer ..	955
Third assistant engineer ...	858

¹ East Coast wages in June 1972 aboard a 12,000-17,000 power ton single screw ship.

Officers and their dependents enjoy substantial pension and welfare benefits. Vacations range from 90 to 180 days a year. Officers with 20 years of service have the option of a monthly pension of \$325 or 37½ percent of their monthly rate of pay. Those who have 25 years of service are eligible for \$425 a month or 50 percent of their monthly rate. Officers forced to retire prematurely due to a permanent disability receive partial pensions. Comprehensive medical care and hospitalization are provided for officers and their families through union programs.

The workweek aboard ship is considerably different from the workweek on shore. At sea, most officers are required to stand watch. Watchstanders work 7 days a week. Generally, they work two 4-hour watches (shifts) during every 24-hour period and have 8 hours off between each watch. Some officers are day workers. They work 8 hours a day, Monday through Friday. Both watchstanders and day workers are paid overtime for work over 40 hours a week. When the ship is in port, the basic workweek is 40 hours for all crew members.

The duties aboard ship are haz-

ardous compared to other industries. At sea, there is always the possibility of injuries from falls or the danger of fire, collision, or sinking.

A number of labor organizations represent merchant marine officers. The two largest are the International Organization of Masters, Mates and Pilots representing deck officers and the National Marine Engineers' Beneficial Association representing engineering officers. The Brotherhood of Marine Officers represents deck and engine officers on some ships. The Staff Officers Association represents pursers aboard certain freighters. Radio officers are represented by the American Radio Association and the Radio Officers Union. In addition, a number of independent unions organize officers on tankers. Officer's unions may require initiation fees as high as \$1,000.

Sources of Additional Information

General information about merchant marine officer's jobs may be obtained from:

Office of Maritime Manpower, Maritime Administration, U.S. Department of Commerce, Washington, D.C. 20235.

Information about job openings, qualifications for employment, wage scales and other particulars can be obtained from local maritime officers' unions. If no maritime union is listed in the local telephone directory, information may be obtained from:

International Organization of Masters, Mates and Pilots, 39 Broadway, New York, N.Y. 10006.

National Marine Engineers' Beneficial Association, 17 Battery Place, New York, N.Y. 10004.

SCIENTIFIC AND TECHNICAL OCCUPATIONS

CONSERVATION OCCUPATIONS

Forests, rangelands, wildlife, soil, and water are important natural resources. Conservationists protect, develop, and manage these resources to assure that future needs will be met.

A young person interested in a career in conservation must have specialized training or experience. Foresters, range managers, and soil conservationists generally need bachelor's degrees in those fields. Short-term or on-the-job training is usually required for other conservation occupations.

In addition to technical knowledge and skills, conservationists must have a sincere interest in the environment and the desire to protect it. They should enjoy dealing with others and like public service since they often work with people in the community. Flexibility also is important since a conservationist may work in a remote camping area one week, speak to a community group the next, and fight a forest or brush fire the next.

This section describes three conservation occupations—foresters, range managers, and soil conservationists.

FORESTERS

(D.O.T. 040.081)

Nature of the Work

Forests are a vital resource. They can be used repeatedly without being destroyed—if properly man-

aged. The condition of our environment has become a major national concern, and foresters play a great role in protecting that environment by insuring that our forests are properly used. They manage, develop, and protect these lands and their resources—timber, water, wildlife, forage, and recreational areas.

Foresters estimate the amount and value of forest resources. They plan and supervise the cutting and planting of trees; the sale of trees and timber; and the processing, marketing, and use of forest products. Foresters also determine the location and type of recreation that can be allowed in the forest. They protect the forests and their resources from fire, harmful animals and insects, and diseases. Other duties include wildlife protection, erosion control, and the supervision of camps, parks, and grazing lands.



Foresters also do research, provide forestry information to forest owners and to the general public (called extension work), and teach at colleges and universities.

Foresters usually specialize in one area of work, such as timber management, outdoor recreation, or forest economics. Some of these areas are recognized as distinct professions.

Places of Employment

About 22,000 persons—most of them men—worked as foresters in 1972. One-third worked in private industry, mainly for pulp and paper, lumber, logging, and milling companies. About one-fourth worked for the Federal Government, primarily in the Forest Service of the Department of Agriculture, although some worked for the Departments of Interior and Defense. The remainder worked for State and local governments, colleges and universities, consulting firms, or were self-employed, either as consultants or forest owners.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in forestry is the minimum educational requirement for those desiring professional careers in forestry. An advanced degree is usually required for teaching and research positions.

Education in forestry leading to a bachelor's or higher degree was offered in 1972 by 51 colleges and universities, of which 39 were accredited by the Society of American Foresters. Curriculums stress the liberal arts as well as technical forestry subjects, since communications skills and the appreciation of American culture are important

to the forester. Specialized forestry courses range from forest ecology (structure of, and interrelationships in the forest community) to forest administration. Many colleges require students to spend one summer in a field camp operated by the college and encourage summer jobs that give firsthand experience in forest or conservation work.

Forestry graduates often work under the supervision of experienced foresters before advancing to more responsible positions in forest management or research.

Foresters must have enthusiasm for outdoor work, and be physically hardy and willing to work in remote areas. Forestry work makes both intellectual and physical demands.

Employment Outlook

Requirements for foresters are expected to increase moderately through the mid-1980's. However, the number of new graduates with degrees in forestry could exceed job openings if current trends in forestry education continue, resulting in keen job competition.

The demand for foresters is expected to rise as the country's growing population and rising living standards increase the demand for forest products and the use of forests for recreational purposes. Employment also may increase as we become more aware of the need to conserve and replenish our forest resources, and to improve environmental quality.

Private owners of timberland are expected to employ more foresters as they recognize the need for and the higher profitability of improved forestry and logging practices. The forest products industries also will require additional foresters to apply new techniques for using the

entire forest crop, to develop methods of growing superior trees in a shorter period of time, and to do research in the fields of plant genetics and fertilization.

Employment opportunities for foresters in the Federal Government probably will not increase significantly because of the changing nature of the forester's duties. Specialized scientists—hydrologists, landscape architects, civil engineers, etc.—will increasingly perform the more scientific work formerly done by the forester. Aides and technicians increasingly may perform some of the routine tasks previously done by foresters, who will be more concerned with the overall administration and coordination of work done by specialists and aides.

On the other hand, State Government agencies will probably continue to hire foresters. Forest fire control, insect and disease protection, technical assistance to owners of forest lands and other Federal-State cooperative programs are usually channeled through State forestry organizations. Growing demand for recreation in forest lands may result in the expansion of State parks and other recreational areas.

College teaching and research in areas such as forest genetics and forest disease also may provide employment opportunities for foresters with graduate degrees.

Earnings and Working Conditions

Foresters earn high salaries compared to the average for nonsupervisory workers in private industry, except farming. In the Federal Government in early 1973, beginning foresters with a bachelor's degree could start at either \$7,694 or \$9,520 a year, depending on their academic record. Those hav-

ing 1 or 2 years of graduate work could begin at \$9,520 or \$11,614, persons having the Ph.D. could start at either \$13,996 or \$16,682 a year. District rangers employed by the Federal Government in 1972 generally earned between \$11,614 and \$16,682 a year. Foresters in top level positions earned considerably more.

Beginning salaries of foresters employed by State governments vary widely, but, with a few exceptions, tend to be lower than Federal salaries. Entrance salaries in private industry, according to limited data, are comparable to Federal salary levels.

Forestry teachers are paid the same as other faculty members. (See statement on College and University Teachers.) Forestry professors may add to their regular salaries with income from part-time consulting and lecturing and the writing of books and articles.

The forester—especially in beginning jobs—spends considerable time outdoors in all kinds of weather. Foresters may also work extra hours on emergency duty, such as fire-fighting.

Sources of Additional Information

General information about the forestry profession, lists of reading materials and lists of schools offering education in forestry are available from:

Society of American Foresters, 1010
16th St. NW., Washington, D.C. 20036.

General information is also available from:

American Forest Institute, 1619 Mas-
sachusetts Ave. NW., Washington,
D.C. 20036.

American Forestry Association, 1319
18th St. NW., Washington, D.C. 20036.

Information on forestry careers

in the Forest Service is available from:

U.S. Department of Agriculture, Forest Service, Washington, D.C. 20250.

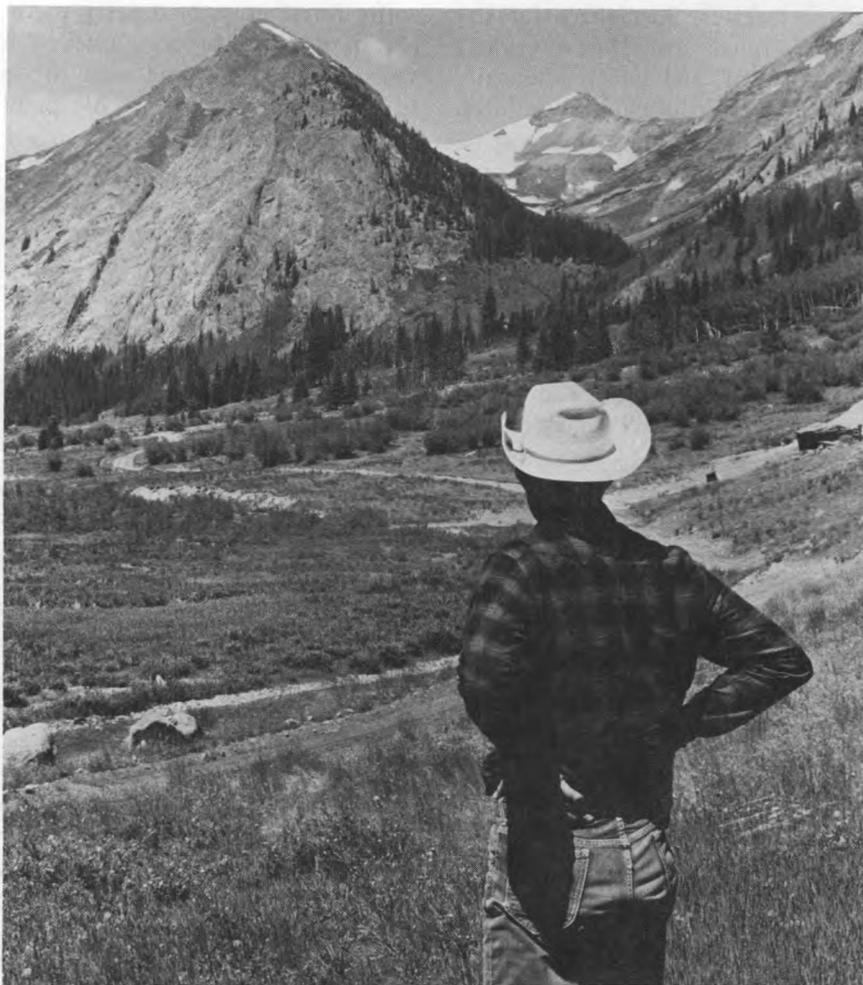
RANGE MANAGERS

(D.O.T. 040.081)

Nature of Work

Rangelands cover more than 1 billion acres of the United States, mostly in the Western States and Alaska. They contain many natural resources: grass and shrubs for animal grazing, habitats for livestock and wildlife, facilities for water sports and other kinds of recreation, and areas for scientific study of the environment. These renewable resources can yield their full potential only if properly managed.

Range managers, sometimes called *range conservationists*, *range scientists*, or *range ecologists*, manage improve, and protect range resources. They decide, for example, the number and kind of animals to be grazed and the best season for grazing; and thus how to yield a high production of livestock while conserving soil and vegetation for other uses such as wildlife grazing, outdoor recreation, watersheds, and growing timber. Range managers also restore or improve rangelands through techniques such as controlled burning, reseeding, and the biological, chemical, or mechanical control of undesirable plants. For example, rangelands with natural sagebrush vegetation may be plowed up and reseeded with a more productive grass. They also determine and carry out range conservation and development needs such as providing for animal watering facilities, erosion control, and fire prevention.



Range managers study terrain to decide the number and kinds of animals to be grazed.

Because of the multiple use of rangelands, range managers often work in such closely related fields as wildlife and watershed management, forest management, and recreation. They also may teach, write reports, conduct research in range management and improvement, and give technical assistance to holders of privately owned grazing lands and to foreign countries.

Places of Employment

About 4,000 persons—most of them men—worked as range managers in 1972. Additional numbers were employed in range management activities but not necessarily

as range managers. The majority worked for Federal, State, and local government agencies. In the Federal Government, most worked in Forest Service and the Soil Conservation Service of the Department of Agriculture and the Bureau of Land Management of the Department of the Interior. Range managers in State governments are employed in game and fish departments, State land agencies, and extension services.

Some range managers work for privately-owned range livestock ranches and consulting firms, and some manage their own land. A few are self-employed consultants. Others work for manufacturing, sales, and

service companies, and as range-land appraisers for banks and real estate firms.

A few range managers also teach and do research at colleges and universities, or work overseas with United States or United Nations agencies or for foreign governments.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in range management or range conservation is the usual background for range managers. In the Federal Government, a degree in a closely related field, such as agronomy or forestry, including courses in range management and range conservation, also may be accepted. Graduate degrees are generally required for teaching and research, and may be helpful for advancement in most jobs.

In 1972, 14 colleges and universities had programs leading to a degree in range management or range science. Ten schools had programs in related fields such as forestry, botany, or agronomy, with an option in range management. Fourteen schools offered a masters degree in range management or range science, and 12 schools offered a Ph.D degree in range science or a related field with a range major.

A degree in range management requires a basic knowledge of biology, chemistry, physics, mathematics, and communication skills. Advanced courses combine plant, animal, and soil sciences with principles of ecology and resource management. Desirable electives include economics, computer science, forestry, wildlife, and recreation.

Federal Government agencies, primarily the Forest Service, the Soil Conservation Service, and the Bureau of Land Management, hire

some college juniors and seniors for summer jobs in range management. This experience may help them qualify for jobs when they graduate.

Many jobs require vigorous physical activity and a willingness to work in arid and sparsely populated areas. Besides having a love for the outdoors, range managers should be able to write and speak effectively and work with others.

Employment Outlook

Employment opportunities for range managers are expected to increase slowly through the mid 1980's. Public concern about the environment, however, could lead to greater opportunities for all types of conservationists, including range managers. Actual hiring needs, though, are heavily dependent on specialized legislation. In the Federal Government, for example, the Wild Horse and Burro Act passed in December 1971 create requirements for range managers to administer the program for protection, control, and management of these animals.

Population growth and increasing consumption of meat and other rangeland animal products should contribute to increasing requirements for range managers. Since the amount of rangeland is generally fixed, range managers will be needed to increase the output of rangelands while protecting their ecological balance. Also, the use of rangelands for other purposes besides livestock grazing such as wildlife protection and recreation could create additional needs for range managers.

If private ranch owners decide to live away from their ranches, these absentee owners may hire professional range managers to operate their ranches. A few openings for

technical assistants are expected in developing countries of the Middle East, Africa, and South America.

In addition to new jobs, some openings will arise from the need to replace those who die, retire, or transfer to other occupations.

Earnings and Working Conditions

Range managers have high earnings compared with average earnings for a nonsupervisory workers in private industry, except farming. In the Federal Government, range managers with the bachelor's degree start at either \$7,694 or \$9,520 a year, depending on their college grades. Those having 1 or 2 years of graduate work begin at \$9,520 or \$11,614; persons with Ph.D. degrees start at either \$13,996 or \$16,682 a year.

Starting salaries for range managers who work for State governments are about the same as those paid by the Federal Government. According to limited data, those who work on private ranches earn somewhat lower salaries than persons who work for government agencies. In colleges and universities, starting salaries are generally the same as those paid other faculty members. (See statement on College and University Teachers.) Range managers in educational institutions sometimes add to their regular salaries with income from part-time consulting and lecturing and from writing books and articles.

Range managers may spend considerable time away from home working outdoors in remote parts of the range.

Sources of Additional Information

Information about a career as a range manager as well as a list of schools offering training is available from:

Society for Range Management, 2120
South Birch St., Denver, Colo. 80222.

For information about career
opportunities in the Federal Govern-
ment, contact:

Bureau of Land Management, Denver
Service Center, Federal Center Building
50, Denver, Col. 80255.

OR

Portland Service Center, 710 N E. Holla-
day St., Portland, Oreg. 97208.

Forest Service, U.S. Department of Agri-
culture, 1621 North Kent Street Arling-
ton, Va. 20415.

Soil Conservation Service, U.S. Depart-
ment of Agriculture, Washington, D.C.
20250.



SOIL CONSERVATIONISTS

(D.O.T. 040.081)

Nature of the Work

Soil conservationists supply farm-
ers, ranchers, and others with tech-
nical assistance for conservation of
soil and water. Farmers and other
land managers use this technical
assistance in adjusting land use,
protecting land against future soil
deterioration, rebuilding eroded and
depleted soils, and stabilizing run-
off and sediment-producing areas.
They also help improve cover on
lands devoted to raising crops, and
maintaining forest, pasture, and
range land, and the wildlife they
support. They help plan water hand-
ling, conserving water for farm and
ranch use, reducing damage from
flood water and sediment, and
draining or irrigating farms or
ranches as needed.

The types of technical services
provided by soil conservationists
are many. Maps present inventories
of soil, water, vegetation, and other
details essential in conservation
planning and application. They de-

velop information, for proper land
utilization and treatment suitable
to planned use of the land, varying
from field or partial farm or ranch
through groups of farms or ranches
to entire watersheds. Relative cost
and expected returns help to deter-
mine various alternatives of land
use and treatment.

After the landowner or operator
decides upon the conservation pro-
gram to use the conservationist re-
cords the relevant facts as part of a
plan. This, together with the maps
and other supplemental information,
constitutes a plan of action for con-
servation farming or ranching. The
soil conservationist then gives the
land manager technical guidance in
applying and maintaining these con-
servation practices.

Soil conservationists provide farmers with technical assistance.

Where Employed

An estimated 12,000 soil con-
servationists were employed in
1972. Most soil conservationists
are employed by Federal Govern-
ment, mainly by the U.S. De-
partment of Agriculture's Soil
Conservation Service and by the
Department of the Interior's
Bureau of Indian Affairs. Some
are employed by colleges and
State and local governments, and
others by banks and public utili-
ties.

Training and Advancement

A Bachelor of Science degree
with a major in soil conservation or
one of the closely related natural

science or agricultural fields, with 30 semester hours in these fields including a 3-semester-hour course in soils, constitute the minimum requirement for soil conservationists. Those who have unusual aptitude in the various phases of the work have good chances of advancement to higher salaried technical administrative jobs.

Employment Outlook

Employment opportunities for well-trained soil conservationists are good. Opportunities in the profession will expand because government agencies, public utility companies, banks, and other organizations are becoming interested in

conservation and are adding conservationists to their staffs. Other new openings will occur in college teaching, particularly at the undergraduate level. In addition, some openings will result because of the normal turnover in personnel.

Earnings

Soil conservationists having a bachelor's degree and employed by the Federal Government received \$7,694 a year in early 1973. Advancement to \$9,520 could be expected after 1 year of satisfactory service. Further advancement depends upon the individual's ability to accept greater responsibility. Earnings of well-qualified Federal soil conser-

vationists with several years' experience range from \$13,996 to \$23,088 a year.

Sources of Additional Information

Additional information on employment as a soil conservationist may be obtained from the U.S. Civil Service Commission, Washington, D.C. 20415; Employment Division, Office of Personnel, U.S. Department of Agriculture, Washington, D.C. 20250; or any office of the Department's Soil Conservation Service.

ENGINEERS

"One small step for man, one giant leap for mankind," were man's first words as he stepped on the surface of the moon. Exploring the moon had been an idea or dream for centuries, and this is one example of what engineering is about, changing ideas into reality. The emphasis on applying scientific principles, rather than on their discovery, is a main factor that distinguishes engineers from scientists.

With over 1 million members engineering is the second largest professional occupation, exceeded only by teachers. For men it is the largest profession. Most engineers specialize in one of the many branches of the profession. More than 25 engineering specialties are recognized by professional societies. Besides the major branches, engineering has over 85 subdivisions. Structural, sanitary, hydraulic, and highway engineering, for example, are subdivisions of civil engineering. Engineers may also specialize in the engineering problems of one industry, or in particular field of technology such as propulsion or guidance systems. Since basic knowledge is required for all areas of engineering, it is possible for engineers to shift from one field of specialization to another, particularly early in their careers. Besides these common areas of basic knowledge and methods, inter-disciplinary programs both within engineering science and other specialties are increasing in popularity. Therefore, persons considering engineering as a career should become familiar with the general nature of engineering as well as with its various branches.

This section which contains an overall discussion of engineering, is followed by separate statements

on 11 branches of the profession— aerospace, agricultural, biomedical, ceramic, chemical, civil, electrical, industrial, mechanical, metallurgical, and mining engineering.

Nature of the Work

Engineers contribute in countless ways to the welfare, technological progress and defense of the Nation by developing methods for making nature's raw materials and power sources into useful products at a reasonable cost. They develop electric power, water supply, and waste disposal systems to meet the problems of urban living. They design industrial machinery and equipment needed to manufacture goods; and heating, air-conditioning, and ventilation equipment for more comfortable living. Engineers also develop scientific equipment to probe outer space and the ocean depths, and design, plan, and supervise the construction of buildings, highways and rapid transit systems. They also, design and develop consumer products such as automobiles, television sets, and refrigerators, and systems for control and automation of manufacturing, business, and management process.

Engineers must consider many factors in developing a new product. In designing a space capsule, for example, they calculate the amount of heat, radiation, and pressure the capsule must withstand for the safety of the occupants and the proper working of its instruments. Experiments are conducted that relate these factors to various materials, as well as to many capsule sizes, shapes, and weights. Equally important are the human needs and limitations of the people who operate the equipment. Engineers also consider the cost of the materials and time needed to complete the product. Similar

factors are applicable to most products ranging from artificial hearts to electronic computers and industrial machinery.

In addition to design and development, engineers work in inspection, quality control, and many other activities related to manufacturing, mining, and agriculture. Some are in administrative and management jobs where an engineering background is necessary. Many are employed in sales where they must discuss the technical aspects of a product and assist in planning its installation or use. (See statement on Manufacturers' Salesmen elsewhere in the Handbook). Some conduct research to supply the technological data needed for the design and production of new or improved products. Other engineers with considerable experience work as consultants. Another group, especially at the Ph.D. level, teach in the engineering and technical schools of colleges and universities.

Engineers within each of the branches may apply their specialized knowledge to many fields. Electrical engineers, for example, may work in medicine, computers, missile guidance, or electric power distribution. Because engineering problems are usually complex, the work in some fields cuts across the traditional branches. Using a team approach to solve problems, engineers in one field often work closely with specialists in other scientific, engineering, and business occupations.

Places of Employment

About 1 million people worked as engineers in 1972, about 1 percent were women. More than half work in manufacturing—mostly in electrical equipment, aircraft and parts, machinery, chemicals, ordnance, instruments, primary metals, fabricated metal products, and

motor vehicles industries. Over 325,000 were employed in non-manufacturing industries in 1972, primarily construction, public utilities, engineering and architectural services, and business and management consulting services.

Federal, State, and local governments employed more than 150,000 engineers. Over half worked for the Federal Government. Many engineers were employed by the Departments of Defense, Interior, Agriculture, Transportation, and the National Aeronautics and Space Administration. Most engineers in State and local government agencies worked in highway and public works departments.

Colleges and universities employed almost 45,000 engineers in research and teaching jobs, and a small number worked for non-profit research organizations.

Engineers are employed in every State, in small and large cities and in rural areas. However, about two-thirds of all engineers in private industry are employed in 10 States, and of these almost one-third are in California, New York, and Pennsylvania. Some branches of engineering are concentrated in particular industries, as shown in the statements later in this chapter.

Training, Other Qualifications, and Advancement

A bachelor's degree in engineering is the generally accepted educational requirement for beginning engineering jobs. College graduates trained in one of the natural sciences or mathematics also may qualify for some beginning jobs. Technicians with exceptional ability, experience, and some engineering education are sometimes able to advance to engineering jobs.

Graduate training is being emphasized for an increasing number of jobs; it is essential for most be-

ginning teaching and research positions, and desirable for advancement. Some specialties, such as nuclear engineering, generally are taught only at the graduate level.

About 280 colleges, universities, and engineering schools offer a bachelor's degree in engineering. Although most schools offer the larger branches of engineering, some specialties are taught in very few institutions. Students desiring specialized training should be familiar with various curriculums before selecting a college. Undergraduate engineering schools require high school courses in mathematics and the physical sciences and the quality of the student's high school work is important in gaining admission.

In a typical 4-year curriculum, the first 2 years are spent on basic science—mathematics, physics, and chemistry—and the humanities, social sciences, and English. The last 2 years are devoted to engineering with emphasis on a specialty. Some programs offer a general engineering education and the student chooses a specialty in graduate school or acquires one on the job.

Some engineering curriculums require more than 4 years to complete. Although, the number of colleges and universities having 5-year programs that lead to the bachelor's degree is decreasing, several now offer 5 year master's degree programs. In addition, several engineering schools now have formal arrangements with liberal arts colleges whereby a student spends 3 years in liberal arts and 2 years in engineering and receives a bachelor's degree from each. These programs offer students diversification in their studies.

Some schools have 5- or even 6-year cooperative plans where the student alternates between school

and work. Most plans coordinate classroom study and practical experience. In addition to gaining experience students may finance part of their education.

All 50 States and the District of Columbia require licensing for engineers whose work may affect life, health, or property, or who offer their services to the public. In 1972, about 325,000 engineers were registered under these laws. Generally, registration requirements include graduation from an accredited engineering school plus 4 years of experience and passing a State examination.

Engineers should be able to work as part of a team, be creative, have initiative, an analytical mind, a capacity for detail, and the ability to make decisions. They should be able to express their ideas to specialists in other areas such as marketing and production planning. Because of rapidly changing technologies, engineers must be willing to continue their education throughout their career.

Engineering graduates usually begin work as assistants to experienced engineers. Many companies have special programs to acquaint new engineers with special industrial practices and to determine the specialties for which they are best suited. Experienced engineers may advance to positions of greater responsibility; those with proven ability often become administrators; increasingly large numbers are being promoted to top executive jobs. Some engineers obtain graduate degrees in business administration to improve their advancement opportunities; others obtain law degrees and become patent attorneys.

Employment Outlook

Employment opportunities for

engineers are expected to be favorable through the mid-1980's. Engineering has been one of the fastest-growing occupations over the past two decades, and opportunities for engineers are expected to increase very rapidly through the mid-1980's though at a slower rate than during the past. Demand probably will be strong for new graduates with knowledge of recent techniques, including computer applications, and for engineers who can apply engineering principles to medical, biological, and other sciences.

Opportunities for engineers are related to population growth and industrial expansion to meet the demand for more goods and services. In addition, more engineering time is required to develop complex industrial products and processes and to increase industrial automation. Public emphasis on solving domestic problems such as environmental pollution, urban redevelopment, and new sources of power should also create additional job opportunities.

Some of the past increases in engineering employment resulted from increases in Federal research and development (R&D) expenditures for space- and defense-related programs. Through the mid-1980's R&D expenditures of Government and industry are expected to continue to increase, but at a slower rate than during the 1960's. The slowdown in Federal R&D spending in the late 1960's and early 1970's basically reflects reductions in the relative importance of the space and defense components of R&D expenditures.

Opportunities for engineers are also affected by defense spending, since a large number of engineers work in defense related activities. The long range outlook for engineers assumes that defense spending in the mid 1980's will be some-

what lower than the peak Vietnam levels. If defense activity should differ substantially from that level, the demand for engineers will be affected.

In addition to the level of defense spending, general business conditions, shifting National priorities, and non-defense-related Federal programs and policies also influence the demand for engineers. Thus, opportunities for engineers fluctuate periodically. In the short-run, the available engineering jobs can either exceed or fall short of the number of persons looking for jobs, but over the long run, engineers can look forward to favorable job opportunities.

Besides filling new jobs, thousands of engineers will have to be trained to replace those who transfer to other occupations, retire, or die. (The outlook for various branches are discussed in the separate statements later in this section.)

Earnings and Working Conditions

New engineering graduates with a bachelor's degree and no experience had average starting salaries of \$10,700 a year in private industry in 1972 according to the College Placement Council. Master's degree graduates with no experience averaged almost \$12,300 a year; Ph.D. graduates averaged about \$16,400. Starting salaries for those with the bachelor's degree vary by branch as shown in accompanying table.

*Starting salaries for engineers, by branch,
1971-72*

<i>Branch</i>	<i>Average starting salaries</i>
Aeronautical engineering ..	\$10,600
Chemical engineering	11,100
Civil engineering	10,400
Electrical engineering	10,700
Industrial engineering	10,500
Mechanical engineering ...	10,700
Metallurgical engineering ..	10,600

In the Federal Government in early 1973, engineers with a bachelor's degree and no experience could start at \$7,694 or \$9,520 a year, depending on their college records. Beginning engineers with a bachelor's degree and 1 or 2 years of graduate work could start at \$9,520 or \$11,614. Those having a Ph.D. degree could begin at \$13,996 or \$16,682.

In colleges and universities, engineers with a Ph.D. degree started in 1972 at about \$12,500 a year as assistant professors for a 9-10 month academic year. (See statement on College and University Teachers elsewhere in the *Handbook*.)

Most engineers can expect an increase in earnings as they gain experience. Average salaries of experienced engineers are about twice those of nonsupervisory workers in private industry, except farming.

According to an Engineering Manpower Commission Survey, the average salary for engineers with 21 to 23 years of experience was \$19,600 in 1972. Some in top-level executive positions had much higher earnings.

Engineers generally work under quiet conditions in modern offices and research laboratories. Some, however, may be involved in more active work—in a mine, at a construction or missile site, or some other outdoor location.

Sources of Additional Information

General information on engineering careers—including student selection and guidance, professional training, salaries, and other economic aspects of engineering—is available from:

Engineers' Council for Professional Development, 345 East 47th St., New York, N.Y. 10017.

Engineering Manpower Commission, Engineers Joint Council, 345 East 47th St., New York, N.Y. 10017.

National Society of Professional Engineers, 2029 K St. NW., Washington, D.C. 20006.

Information on engineering schools, curriculums, training, and other qualifications needed for entrance into the profession also may be obtained from the Engineers Council for Professional Development. Information on registration of engineers may be obtained from:

National Council of Engineering Examiners, P.O. Box 752, Clemson, S.C. 29613.

For information about graduate study contact:

The American Society of Engineering Education, One Dupont Circle, Suite 400, Washington, D.C. 20036.

Engineering societies representing the individual branches of the engineering profession are listed later in this chapter. Each can provide information about careers in the particular branch. Many other engineering organizations are listed in the following publications available in most libraries or from the publisher.

Engineering Societies Directory, published by Engineers Joint Council, 345 East 47th St., New York, N.Y. 10017.

Scientific and Technical Societies of the United States and Canada, published by the National Academy of Sciences, National Research Council.

role in America's space activities. They work on all types of aircraft and spacecraft including missiles, rockets, and propeller-driven and jet-powered planes. They develop aerospace products from the initial planning and design to the final assembly and testing.

Aerospace engineers generally specialize in an area of work like structural design, navigational guidance and control, instrumentation and communication, or production methods. They also may specialize in one type of aerospace products such as passenger planes, launch vehicles, satellites, manned space capsules, or landing modules.

Engineers working in the aircraft field are usually called aeronautical engineers. Those in the field of missiles, rockets, and spacecraft often are referred to as astronautical engineers. However, engineers with degrees in aeronautics and astronautics are usually called aerospace engineers.

Places of Employment

About 60,000 aerospace engineers—many with degrees in mechanical, electrical or industrial engineering—were employed in 1972, mainly in the aircraft and parts industry. Some worked for Federal Government agencies, primarily the National Aeronautics and Space Administration and the Department of Defense. A few worked for commercial airlines, consulting firms, and colleges and universities.

craft and the quiet short-haul air transportation system (QSATS), as well as the space shuttle, should provide job opportunities. Research with lasers and advancement in missiles and space exploration followed by unmanned flights to other planets will require aerospace engineers. As the demand for high speed ground transportation increases, engineers familiar with aerospace techniques could be needed for their development.

With the end of the Vietnam conflict and priorities now aimed at health and environmental control, and the encouragement of industry to expand the peaceful uses of atomic energy, aerospace engineers with diversified training such as bioengineering and radiation protection will be needed. Additional openings for aerospace engineers will arise from the need to replace those who transfer to other fields of work, retire, or die.

Aerospace engineers are particularly sensitive to changes in defense spending. Those who are not well grounded in engineering fundamentals and whose specialization is very narrow could be affected adversely by changes in defense activities and rapidly changing technology. Therefore employment opportunities fluctuate, and the demand can fall short of the supply in any year. Employment opportunities however, are expected to increase over the long run. This outlook assumes that defense spending will be somewhat lower than the peak Vietnam levels. If defense activities should differ substantially from that level, the demand for aerospace engineers will be affected. (See introductory section of this chapter for discussion of training requirements and earnings. See also statement on Aircraft, Missile, and Spacecraft Manufacturing elsewhere in the *Handbook*.)

AEROSPACE ENGINEERS

(D.O.T. 002.081)

Nature of the Work

Aerospace engineers play a vital

Employment Outlook

Job opportunities for aerospace engineers are expected to grow moderately through the mid-1980's. Development of vertical and short take-off and landing (V/STOL) air-

Sources of Additional Information

American Institute of Aeronautics and Astronautics, Inc., 1290 Avenue of the Americas, New York, N.Y. 10019.

AGRICULTURAL ENGINEERS

(D.O.T. 013.081)

Nature of the Work

Agricultural engineers develop machinery, equipment, and methods to improve the efficiency and economy of the production, processing, and distribution of food and other agricultural products. They design farm machinery, equipment, and structures, and develop methods for utilizing electrical energy on farms and in food and feed processing plants. Agricultural engineers also are concerned with the conservation and management of soil and water resources, and with the design and operation of processing equipment to prepare agricultural products for market. They generally specialize in research and development, design, testing, production, sales, or management.

Places of Employment

Most of the 12,000 agricultural engineers employed in 1972 worked for manufacturers of farm and household equipment, electric service companies, and distributors of farm equipment and supplies. Some worked for engineering consultants who supply services to farmers and farm related industries; others are independent consultants.

The Federal Government employs about 600 agricultural engineers in the Soil Conservation Service and Agricultural Research Service of the Department of Agriculture. Some are employed by colleges and uni-

versities, and a few are employed by State and local governments.

Employment Outlook

Job opportunities for agricultural engineers are expected to grow rapidly through the mid-1980's. The modernization of farm operations, increasing emphasis on conservation of resources, and the use of agricultural products and wastes as industrial raw materials should provide increasing opportunities for agricultural engineers. The increasing use of energy and power on farms also should provide opportunities for additional engineers. (See introductory part of this section for information on training requirements and earnings. See also statement on Agriculture elsewhere in the *Handbook*.)

Sources of Additional Information

American Society of Agricultural Engineers, 2950 Niles Rd., St. Joseph, Mich. 49085.

BIOMEDICAL ENGINEERS

Nature of the Work

Biomedical engineers use engineering principles to solve medical and health related problems. Many in research, working with life scientists, chemists, and members of the medical profession study the engineering aspects of the biological systems of man and animals. Some design and develop medical instruments and devices including artificial hearts and kidneys. Biomedical engineers have helped develop lasers for surgery and cardiac pacemakers that regulate the heartbeat. Other biomedical engineers adapt computers to medical science by mon-

itoring patients and processing electrocardiograph data. Some design and build systems to modernize laboratory, hospital and clinical procedures. A few sell medical instruments and equipment to physicians, research centers, and hospitals.

Places of Employment

There were 3,000 biomedical engineers in 1972; most members of this branch of engineering teach and do research in colleges and universities. Some work for the Federal Government, primarily in the National Aeronautics and Space Administration. Others work in State agencies, and an increasing number work in private industry or hospitals, developing new devices, techniques, and systems for improving health care. Some work in sales positions.

Employment Outlook

Job opportunities for biomedical engineers are expected to be very favorable through the mid-1980's. Biomedical engineering is a small field and has few openings in a year compared with larger branches of engineering, but the number of graduates is small.

Those who have master's and doctor's degrees will be in strong demand to teach and fill jobs resulting from increased expenditures for research and to develop more artificial devices. Research could create new positions in instrumentation and systems for the delivery of health services. (See introductory part of this chapter for information on training requirements and earnings.)

Sources of Additional Information

Alliance for Engineering in Medicine and Biology, 3900 Wisconsin Ave. NW., Suite 300, Washington, D.C. 20016.



Most biomedical engineers do research.

Biomedical Engineering Society
P.O. Box 1600, Evanston, Ill. 60204.
Foundation for Medical Technology
Mt. Sinai Medical Center, 100
Street, 5th Ave., New York, N.Y.
10029.

CERAMIC ENGINEERS

(D.O.T. 006.081)

Nature of the Work

Ceramic engineers work with one of the world's oldest and yet newest technologies. They develop methods for processing clay and other non-metallic minerals into a wide variety

of ceramic products. These range from glassware, cement, bricks, coatings, and heat resisting materials for missile nose cones to electronic components and materials used as body sensors and monitors. They also design and supervise the construction of plants and equipment to manufacture these products. Many are engaged in research and development. Some work in administration, production, and sales; others work as consultants or teach in colleges and universities.

Ceramic engineers generally specialize in one or more products—for example, products of refractories (fire-and heat-resistant materials such as firebrick); whitewares (porcelain and china dinnerware or high voltage electrical insulators);

structural materials (such as brick tile, and terra cotta); electronic ceramics (ferrites for memory systems and microwave devices); protective and refractory coatings for metals; glass; abrasives; or fuel elements for atomic energy.

Places of Employment

About 12,000 ceramic engineers were employed in 1972, mostly in the stone, clay, and glass industries. Others work in industries that produce or use ceramic products such as iron and steel, electrical equipment, aerospace, and chemicals. Some are in the educational field, independent research organizations, and the Federal Government.

Employment Outlook

Job opportunities for ceramic engineers are expected to be very good through the mid-1980's. Although ceramic engineering is a small field, and has few openings in a year compared with large branches of engineering, the number of graduates is small.

Programs related to nuclear energy, electronics, space exploration, and medical science will provide many opportunities for ceramic engineers. Ceramic materials, which are corrosion-resistant and able to withstand radiation and extremely high temperatures, are becoming increasingly important in the development of nuclear reactors and space vehicles. The use of more traditional ceramic products, such as whitewares and abrasives, for consumer and industrial use will require additional ceramic engineers to improve and adapt these products to new uses. The use of structural clay and tile products in construction also will add to employment opportunities. The development of filters and catalytic surfaces to reduce pollution and the expanding

use of glass in the construction and container fields should create additional openings for ceramic engineers. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Ceramic Society, 65 Ceramic Dr., Columbus, Ohio 43214.

CHEMICAL ENGINEERS

(D.O.T. 008.081)

Nature of the Work

Chemical engineers design chemical plants and equipment, and determine the most efficient process to manufacture chemicals and chemical products. This requires a knowledge of chemistry, physics, and mechanical and electrical engineering. They often design and operate pilot plants to test their work.

This branch of engineering is so diversified and complex that chemical engineers frequently specialize in a particular operation such as oxidation or polymerization. Others specialize in a particular area such as environmental control or in the production of a specific product like plastics or rubber. Chemical engineers may work in research and development, production, plant operations, design, sales, management or teaching.

Places of Employment

Most of the 50,000 chemical engineers working in 1972 were in manufacturing industries, primarily those producing chemicals, petroleum, and related products. Some were employed by government agencies and by colleges and uni-

versities. A small number worked for independent research institutes and engineering consulting firms, or as independent consulting engineers.

Employment Outlook

Opportunities for chemical engineers are expected to increase moderately through the mid-1980's. A major factor underlying this growth is industry expansion—the chemicals industry in particular.

The growing complexity and automation of chemical processes will require additional chemical engineers to design, build, and maintain the necessary plants and equipment. Chemical engineers also will be needed in many new areas of work, such as environmental control, synthetic food processing, and in the design and development of nuclear reactors. In addition, new chemicals used to manufacture consumer goods, such as plastics and manmade fibers, probably will create additional openings. (See introductory part of this section for information on training requirements and earnings. See also the statement on Chemists and the Industrial Chemical Industry elsewhere in the *Handbook*.)

Sources of Additional Information

American Institute of Chemical Engineers, 345 East 47th St., New York, N.Y. 10017.

CIVIL ENGINEERS

(D.O.T. 005.081)

Nature of the Work

Civil engineering is one of the oldest branches of the profession. These engineers design and super-

vised the construction of roads, harbors, airfields, tunnels, bridges, water supply and sewage systems, and buildings. Major specialties within civil engineering are structural, hydraulic, environmental, sanitary, transportation (including highways and railways), and soil mechanics.

Many civil engineers are in supervisory or administrative positions ranging from site supervisor of a construction project or city engineer to top-level executive. Some are engaged in design, planning, research, and inspection. Others teach in colleges and universities or work as consultants.

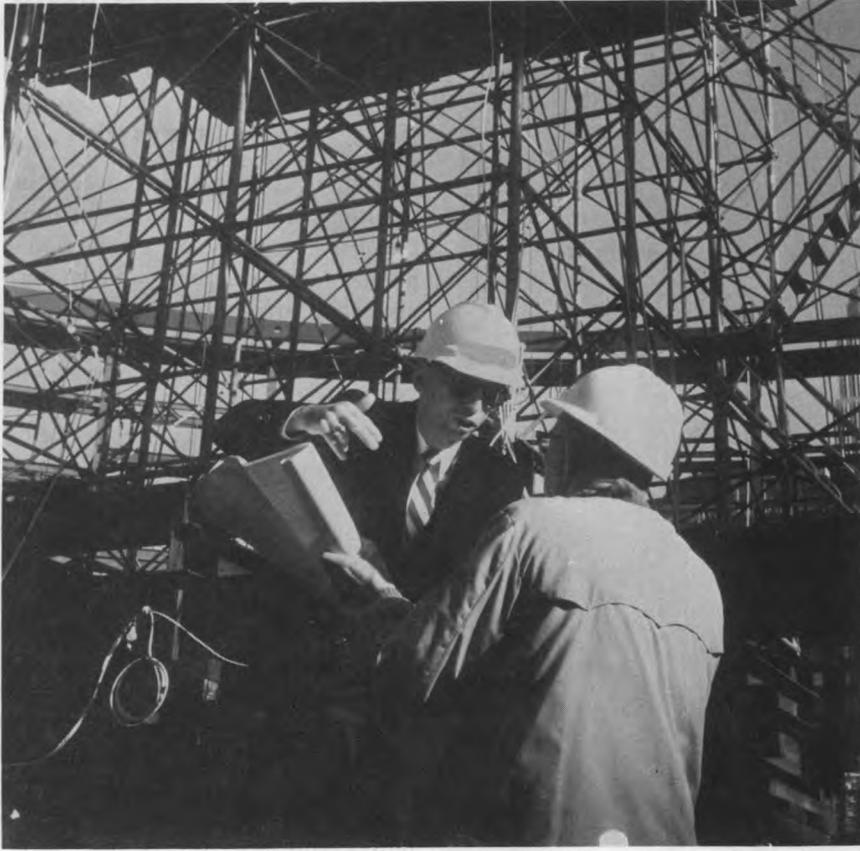
Places of Employment

About 180,000 civil engineers were employed in 1972. Most work for Federal, State, and local government agencies and in the construction industry. Many work for consulting engineering and architectural firms or as independent consulting engineers. Others work for public utilities, railroads, educational institutions, and in the iron and steel and other major manufacturing industries.

Civil engineers work in all parts of the country, usually in or near major industrial and commercial centers. They are often called upon to work at construction sites, and are sometimes stationed in remote areas or in foreign countries. In some jobs, they must often move from place to place to work on different projects.

Employment Outlook

Opportunities for civil engineers should increase rapidly through the mid-1980's. Job opportunities will result from the growing needs for housing, industrial buildings, and highway transportation systems



Engineers supervise construction of buildings and other projects.

created by an increasing population and expanding economy. Work related to problems of urban environment, such as water and sewage systems, air and water pollution, urban redevelopment, and rapid transit systems may require additional civil engineers.

Large numbers of civil engineers also will be needed each year to replace those who retire or die. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Society of Civil Engineers
345 East 47th St., New York, N.Y.
10017.

ELECTRICAL ENGINEERS

(D.O.T. 003.081, .151, and .187)

Nature of the Work

Electrical engineers design, develop, and supervise the manufacture of electrical and electronic equipment. These include electric motors and generators; communications equipment; electronic equipment such as heart pacemakers, pollution measuring instrumentation, radar, computers, lasers, and missile guidance systems; and electrical appliances of all kinds. They also design and assist in operating facilities for generating and distributing electrical power.

Electrical engineers generally specialize in a major area of work such

as electronics, electrical equipment manufacturing, communications, or power. Others specialize in subdivisions of these broad areas like computers or missile guidance and tracking systems. Many are engaged in research, development, and design activities. Some are in administrative and management jobs; others work in various manufacturing operations or in technical sales or teaching jobs.

Places of Employment

Electrical engineering is the largest branch of the profession. More than 230,000 electrical engineers were employed in 1972, mainly by manufacturers of electrical and electronic equipment, aircraft and parts, business machines, and professional and scientific equipment. Many work for telephone, telegraph, and electric light and power companies. Large numbers are employed by government agencies and by colleges and universities. Others work for construction firms, for engineering consultants, or as independent consulting engineers.

Employment Outlook

Job opportunities for electrical engineers are expected to increase very rapidly through the mid-1980's. Increased demand for electrical equipment to automatically control production processes, using such items as computers and sensing devices, is expected to be among the major factors contributing to this growth. The demand for electrical and electronic consumer goods along with increased research and development in nuclear power generation should create job openings for electrical engineers. Many electrical engineers also will be needed to replace personnel who retire or die.

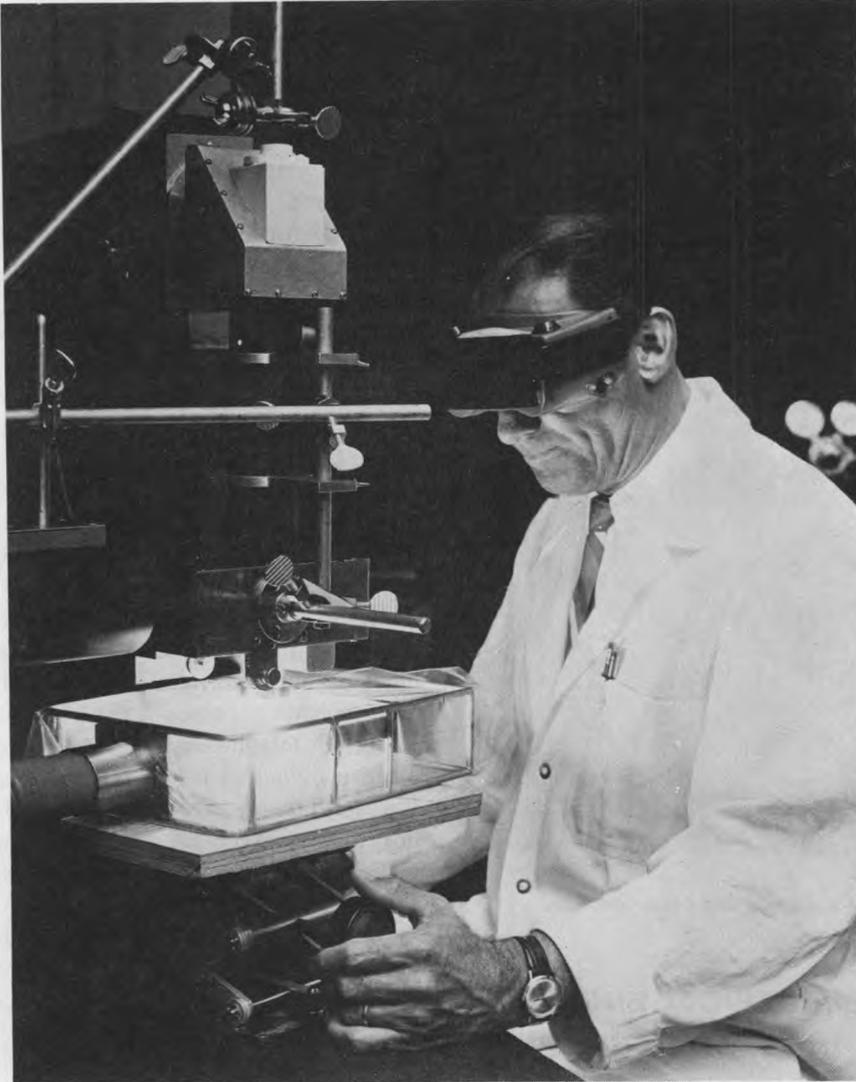
INDUSTRIAL ENGINEERS

(D.O.T. 012.081, .168, and .188)

Nature of the Work

Industrial engineers determine the most effective methods of using the basic factors of production—manpower, machines, and materials. They are more concerned with people and “things,” in contrast to engineers in other specialties who generally are concerned more with developmental work in their fields, such as power and mechanics.

They design systems for data processing and apply operations research techniques to organizational, production, and related problems. Industrial engineers also develop management control systems to aid in financial planning and cost analysis. They design production planning and control systems to coordinate activities and control product quality, and may design and improve systems for the physical distribution of goods and services. Other activities include plant location surveys, where they must consider sources of raw materials, the work force, financing, taxes, and the development of wage and salary administration and job evaluation programs.



Electrical engineers work with lasers.

The long range outlook for electrical engineers assumes that defense spending in the mid-1980's will be somewhat lower than the peak Vietnam levels. If defense activity should differ substantially from that level, the demand for electrical engineers will be affected.

(See introductory part of this section for information on training requirements and earnings. See also statement on Electronics Manufacturing elsewhere in the *Handbook*.)

Sources of Additional Information

Institute of Electrical and Electronic Engineers, 345 East 47th St., New York, N.Y. 10017.

Places of Employment

About 125,000 industrial engineers were employed in 1972; more than two-thirds worked in manufacturing industries. They are more widely distributed among manufacturing industries than are those in other branches of engineering. Some work for insurance companies, banks, construction and mining firms, and public utilities. Hospitals, retail organizations, and other large business firms employ industrial engineers to improve op-



Industrial engineer tapes operation to check for problems.

erating efficiency. Still others work for government agencies and educational institutions. A few are independent consulting engineers.

Employment Outlook

Opportunities for industrial engineers are expected to grow very rapidly through the mid-1980's. The increasing complexity of industrial operations and the expansion of automated processes, along with industry growth, are factors contributing to increased requirements for these engineers. Increased recognition of the importance of scientific management and safety engineering in reducing costs and increasing productivity, and newer areas of work such as noise, air, and water pollution control should create additional opportunities.

Additional numbers of industrial engineers will be required each year to replace those who retire, die, or transfer to other occupations. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Institute of Industrial Engineers, Inc., 25 Technology Park/
Atlanta, Norcross, Ga. 30071.

MECHANICAL ENGINEERS

(D.O.T. 007.081, .151, .168, .181, and .187; 011.081, and 019.187)

Nature of the Work

Mechanical engineers are concerned with the production, transmission, and use of power. They design and develop machines that produce power, such as internal combustion engines, steam and gas turbines, jet and rocket engines, and nuclear reactors. They also design and develop a great variety of machines that use power—refrigeration and air-conditioning equipment, elevators, machine tools, printing presses, steel rolling mills, and many others.

Many specialized areas of work have developed within this field and, since mechanical engineers are employed in nearly all industries, their work varies with the industry and the function performed. Among these specialties are motor vehicles, marine equipment, steampower, heating, ventilating and air-conditioning, instrumentation, and machines for specialized industries, such as petroleum, rubber and plastics, and construction.

Large numbers of mechanical engineers do research, development, test, and design work. Many work in administrative and management activities. Others work in maintenance, marketing and sales, and activities related to production and operations in manufacturing. Some teach in colleges and universities or work as consultants.

Places of Employment

About 210,000 mechanical engineers were employed in 1972. Almost three-fourths were employed in manufacturing—mainly in the

primary and fabricated metals, machinery, transportation equipment, and electrical equipment industries. Others work for government agencies, educational institutions, and consulting engineering firms.

Employment Outlook

Opportunities for mechanical engineers are expected to grow rapidly through the mid-1980's. The expansion of industry along with the demand for industrial machinery and machine tools and the increasing complexity of industrial machinery and processes will be major factors supporting increased employment opportunities. Expenditures for research and development also will be a factor in the growth. Newer areas of work, such as atomic energy and environmental control, will provide additional openings.

Large numbers of mechanical engineers also will be required each year to replace those who retire or die. (See introductory part of this section for information on training requirements and earnings. See also statement on Occupations the Atomic Energy Field elsewhere in the *Handbook*.)

Sources of Additional Information

The American Society of Mechanical Engineers, 345 East 47th St., New York, N.Y. 10017.

METALLURGICAL ENGINEERS

(D.O.T. 011.081)

Nature of the Work

Metallurgical engineers develop



Metallurgical engineers use scientific equipment to study the structural make-up of materials.

methods to process and convert metals into useful products. These engineers generally work in one of the three main branches of metallurgy—extractive or chemical, physical, and mechanical. Extractive metallurgy involves the extraction of metals from ores and refining and alloying them to obtain pure metal. Physical metallurgy deals with the nature, structure and physical properties of metals and their alloys, and with methods of converting refined metals into final products. Mechanical metallurgy involves the working and shaping of metals by casting, forging, rolling and drawing. Scientists working in this field are known as metallurgists but the distinction between scientists and engineers is small. People working in the field of metallurgy are in-

creasingly being referred to as either materials scientists or materials engineers.

Places of Employment

The metalworking industries—primarily the iron and steel and nonferrous metals industries—employed over one-half of the estimated 10,000 metallurgical engineers in 1972. Many metallurgical engineers work in industries that manufacture machinery, electrical equipment, and aircraft and parts. Others work in the mining industry. Some work for government agencies, consulting firms, independent research organizations, and colleges and universities.

Employment Outlook

Employment opportunities for

metallurgical engineers are expected to grow very rapidly through the mid-1980's. An increasing number of these engineers will be needed by the metalworking industries to develop new metals and alloys as well as to adapt current ones to new needs. For example, the development of such products as supersonic jet aircrafts, missiles, satellites, spacecrafts, and computers has brought about a need for lightweight metals of high purity, able to withstand both extremely high and low temperatures. Metallurgical engineers also will be needed to solve metallurgical problems associated with the efficient use of nuclear energy. As the supply of high-grade ores diminishes, more metallurgical engineers will be required to find new ways of recycling solid waste materials in addition to processing low-grade ores now regarded as unprofitable to mine. They also will be needed to solve problems connected with air and water pollution control, noise abatement, urban renewal, public transportation, and biomedical devices. (See introductory part of this section for information on training requirements and earnings. Also see statement on the Iron and Steel Industry elsewhere in the *Handbook*.)

MINING ENGINEERS

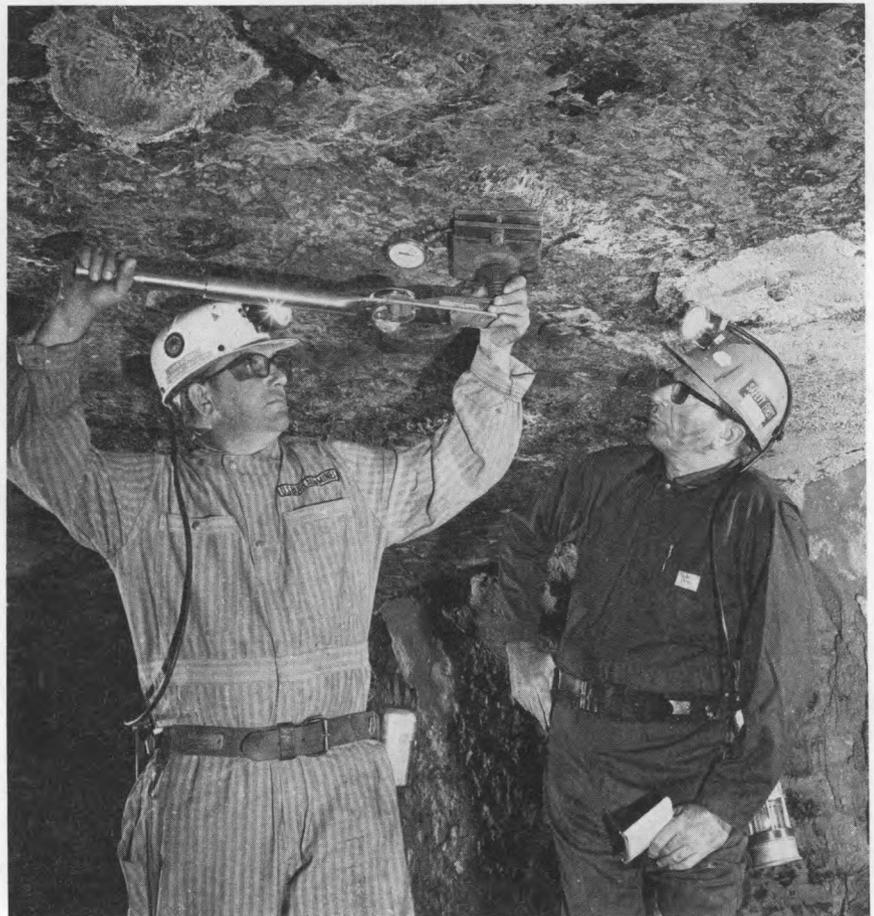
(D.O.T. 010.081 and .187)

Nature of the Work

Mining engineers find, extract, and prepare minerals for manufacturing industries to use. They design the layouts of mines, supervise the construction of mine shafts and tunnels in underground operations, and devise methods for transporting minerals to processing plants. Mining engineers are responsible for the efficient operation of mines and mine safety, including ventilation, water supply, power, communications, and equipment maintenance. Some mining engi-

neers work with geologists and metallurgical engineers to locate and appraise new ore deposits. Others develop new mining equipment and devise improved methods to process extracted minerals. With increased emphasis on the environment, many mining engineers have been working to solve problems related to mined-land reclamation and water and air pollution control.

Mining engineers frequently specialize in the extraction of specific metal ores, coal, and other non-metallic minerals. Engineers who specialize in the extraction of petroleum and natural gas are usually considered members of a separate branch of the engineering profession—Petroleum Engineering.



Mining engineers are concerned with mine safety.

Sources of Additional Information

The Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers
345 East 47th St., New York, N.Y.
10017.

American Society of Metals, Metals Park, Ohio 44073.

Places of Employment

About 5,000 mining engineers were employed in 1972. Most work in the mining industry. Some work in colleges and universities, for government agencies, or as independent consultants. Others work for firms that produce equipment for the mining industry.

Mining engineers are usually employed at the location of mineral deposits, often near small communities. However, those in research, teaching, management, consulting, or sales are often located in large metropolitan areas.

Employment Outlook

Employment opportunities for

mining engineers are expected to be favorable through the mid-1980's. The number of new graduates in mining engineering is expected to be fewer than the number needed to replace those who die, retire, or transfer to other fields of work.

Exploration for minerals is increasing, both in the United States and in other parts of the world. Easily mined deposits are being depleted, creating a growing need for engineers to mine newly discovered mineral deposits and to devise more efficient methods for mining low-grade ores. Additional employment opportunities for mining engineers will arise as new alloys and new uses for metals increase the demand for less widely used ores. Recovery of metals

from the sea and the development of recently discovered oil shale deposits could present major challenges to the mining engineer. (See introductory part of this section for information on training requirements and earnings. See also statement on Mining elsewhere in the *Handbook*.)

Sources of Additional Information

The Society of Mining Engineers of the American Institute of Mining, Metallurgical, and Petroleum Engineers
345 East 47th St., New York, N.Y.
10017.

ENVIRONMENTAL SCIENTISTS

Environmental scientists help us live within our physical environment. They play an important role in solving environmental pollution problems. These scientists, sometimes known as earth scientists, are concerned with the history, composition, and characteristics of the earth's surface, interior, and atmosphere. Some do basic research to increase scientific knowledge. Others solve practical problems. Geologists, for example, explore for new sources of oil, other fuels, and ores. Still others do applied research and use knowledge gained from basic research to help answer important questions. Meteorologists, for example, use scientific knowledge to forecast the weather. Many environmental scientists teach in colleges and universities. Others administer scientific programs and operations.

Many environmental scientists specialize in one particular branch of their broad occupational field. This chapter discusses the specialties and the employment outlook for four environmental science occupations—geologists, geophysicists, meteorologists, and oceanographers.

GEOLOGISTS

(D.O.T. 024.081)

Nature of the Work

Geologists study the structure, composition, and history of the earth's crust in order to locate natural resources, give warnings

of natural disasters, and help see that buildings are put on firm foundations. By examining rocks and drilling to recover rock cores, they determine their distribution, thickness, and slope beneath the earth's surface. They also identify rocks and minerals, conduct geological surveys, draw maps, take measurements, and record data.

Geologists use many tools and instruments such as hammers, chisels, levels, transits (mounted telescopes used to measure angles), gravity meters, cameras, compasses, and seismographs (instruments that record the intensity and duration of earthquakes and earth tremors). They also evaluate information from photographs taken from aircraft and satellites and use computers to record and analyze data.

Geologists also work in laboratories where they examine the chemical and physical properties of specimens under controlled temperature and pressure. They may study fossil remains of animal and vegetable life or experiment with the flow of water and oil through rocks. Laboratory equipment used by geologists includes complex instruments such as the X-ray diffractometer, which determines the structure of minerals, and the petrographic microscope for close study of rock formations.

Geologists do other things besides locating resources and working in laboratories. They advise construction companies, and Federal, State, and local governments on the suitability of certain locations for constructing buildings, dams, or highways. Some geologists administer and manage research and exploration programs. Others teach and work on research projects in colleges and universities.

Geologists usually specialize in one or a combination of three general areas—earth materials, earth processes, and earth history.

Economic geologists locate earth materials such as minerals and solid fuels. *Petroleum geologists* search for and recover liquid fuels—oil and natural gas. Some petroleum geologists work near drilling sites and others correlate petroleum-related geologic knowledge for entire regions. *Engineering geologists* determine suitable sites for the construction of roads, airfields, tunnels, dams, and other structures. They decide, for example, whether underground rocks will bear the weight of a building or whether a structure may be in an earthquake prone area. *Mineralogists* analyze and classify minerals and precious stones according to composition and structure. *Geochemists* study the chemical composition and changes in minerals and rocks to understand the distribution and migration of elements in the earth's crust.

Geologists concerned with earth processes study landforms and their rock masses, sedimentary (matter deposited by water or wind) deposits and eruptive forces such as volcanoes. *Volcanologists* study active and inactive volcanoes, lava flows, and other eruptive activity. *Geomorphologists* examine landforms and forces such as erosion and glaciation which cause them to change.

Other geologists are most concerned with earth history. *Paleontologists* study plant and animal fossils to trace the evolution and development of past life. *Geochronologists* determine the age of rocks and landforms by the radioactive decay of its elements. *Stratigraphers* study the distribution and arrangement of sedimentary rock layers by examining their fossil and mineral content.

Many geologists specialize in new fields that require knowledge of another science. *Astrogeologists* study geological conditions on

other planets. *Geological oceanographers* study the sedimentary and other rock on the ocean floor and continental shelf. (See statements on Oceanographers and Mining elsewhere in the *Handbook*.)

Places of Employment

About 23,000 people worked as geologists in 1972, over half in private industry. Most industrial geologists work for petroleum producers, many for American companies exploring in foreign nations. Geologists also work for mining and quarrying companies. Some are employed by construction firms and others are independent consultants to industry and government.

The Federal Government employs over 1,600 geologists. Two-thirds work for the Department of the Interior in the U.S. Geological Survey, the Bureau of Mines, and the Bureau of Reclamation. State agencies also employ geologists, some working on surveys in cooperation with the U.S. Geological Survey.

Colleges and universities employ almost 7,500 geologists. Some work for nonprofit research institutions and museums.

Training, Qualifications, and Advancement

Students seeking professional careers as geologists should earn an advanced degree. The master's

degree is required for beginning research and teaching and most exploration jobs. Advancement in college teaching and high-level research and administrative posts usually require the Ph.D. The bachelor's degree is adequate training for some entry jobs in exploration work.

About 300 colleges and universities offer a bachelor's degree in geology. Undergraduate students devote about one-fourth of their time to geology courses, including historical geology, structural geology, mineralogy, petrology, and invertebrate paleontology. Students spend about a third of their time taking mathematics, related sciences—such as physics and chemistry—and engineering; the remainder is general academic subjects. Statistics and computer courses are especially recommended.

More than 160 universities award advanced degrees in geology. Graduate students take advanced courses in geology and specialize in one branch of the science.

Students planning careers in exploration geology should like the outdoors, and have physical stamina. They should be able to adapt to changes brought about by travel to distant countries. Geologists often travel to remote sites by helicopter and jeep and cover large areas by foot. Generally, they work in teams. Geologists need curious and analytical minds to solve complex geological problems.

Geologists with advanced degrees usually begin their careers in field exploration or as research assistants in laboratories. After suitable experience, they may be promoted to project leaders, program managers, or other management and research positions.

Employment Outlook

Employment opportunities for



Geologists should like outdoor work.

geologists with advanced degrees are expected to be favorable through the mid-1980's. Hundreds of opportunities should open up each year because of the expected growth in the field and to replace geologists who are promoted to managerial positions, transfer to other fields, die, or retire. Those with bachelor's degrees may face competition for entry jobs and some may have to work as technicians or surveyors. For those with only bachelor's degrees, opportunities will be more favorable with some training in geophysical exploration techniques.

Demand for geologists will continue in Federal agencies, particularly the U.S. Geological Survey. College and university employment probably will rise, mainly for those having Ph.D. degrees.

Geologists may want to consider related employment activities outside the field. For instance, geologists may take training to qualify as science teachers in secondary schools.

Consumer and industrial demand for petroleum and minerals will continue to rise, and geologists with advanced degrees will be required to locate and recover new deposits to fill increased demand and replenish old supplies. However, indications are that employment of geologists with advanced degrees in petroleum and mineral extraction will be more limited in the near future than in the past. Additional geologists will be needed to discover new resources and their potential uses. For example, geologists will help determine the feasibility of using geothermal energy (steam from the earth's interior) to generate electricity. Geologists also are needed to devise techniques for exploring deeper within the earth's crust and to develop more efficient methods of

mining resources. Geologists also are needed to develop adequate water supplies, waste disposal methods, and building materials and site evaluation for construction activities. Increased emphasis on the environment by urban societies also should affect requirements for geologists. For example, pollution control, better land use and reclamation programs, and highway construction activities require the talents of geologists.

Earnings and Working Conditions

Geologists have relatively high salaries, with average earnings over twice those received by nonsupervisory workers in private industry, except farming.

Starting salaries for new graduates averaged \$9,000 a year in 1972 for those having a bachelor's degree, \$11,000 for those having a master's degree, and \$13,000 for those having a doctorate, according to the American Geological Institute's annual survey.

In the Federal Government in early 1973, geologists having a bachelor's degree could begin at \$7,694 or \$9,520 a year, depending on their college records. Beginning geologists having the master's degree could start at \$9,520 or \$11,614, depending on their academic records or previous work experience. Those having the Ph.D. degree could begin at \$13,996 or \$16,682.

Geologists often work outdoors in many different climates and geographical areas. Field work requires hard physical labor and long hours with limited companionship. Geologists in mining may be required to work underground. When not working outdoors, they are in comfortable, well-lighted, well-ventilated offices and laboratories.

Sources of Additional Information

General information on career opportunities, training, and earnings for geologists is available from:

American Geological Institute, 2201 M St. NW., Washington, D.C. 20037.

For information on Federal Government careers contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C. 1900 E St. NW., Washington, D.C. 20415.

GEOPHYSICISTS

(D.O.T. 024.081)

Nature of the Work

Geophysicists study the composition and physical aspects of the earth and other planets—their interiors, surfaces, and atmospheres. They investigate the earth's physical characteristics, such as its electric, magnetic, and gravitational fields. Geophysicists use highly complex instruments such as the magnetometer which measures variations in the earth's magnetic field, and the gravimeter which measures minute variations in gravitational attraction. They may use satellites to conduct tests in outer space and use computers to collect and analyze data.

Geophysicists usually specialize in one of three general phases of the science—solid earth, fluid earth, and upper atmosphere.

Solid earth geophysicists search for oil and mineral deposits, map the earth's surface, and are concerned with earthquakes. *Exploration geophysicists* use seismic prospecting techniques to locate oil and mineral deposits. They send sound waves into the earth and

record the echoes bouncing off the rock layers below to determine if they are favorable for the accumulation of oil.

Seismologists study the earth's interior and earth vibrations caused by earthquakes and manmade explosions. They explore for oil and minerals, study underground detection of nuclear explosions, and provide information for use in constructing bridges, dams, and buildings. For example, in constructing a dam, seismologists determine where bedrock (solid rock beneath the soil) is closest to the surface so the best dam site can be selected. They use explosives to create sound waves which reflect off bedrock; the time it takes for the shock wave to return to the surface indicates the depth of bedrock.

Geodesists study the size, shape,

and gravitational field of the earth and other planets. Their principal task is mapping the earth's surface. With the aid of satellites, geodesists determine the positions, elevations, and distances between points on the earth, and measure the intensity and direction of gravitational attraction.

Hydrologists are concerned with the fluid earth. They study the distribution, circulation, and physical properties of underground and surface waters, including glaciers, snow, and permafrost. They also study rainfall and its rate of infiltration into soil. Some are concerned with water supplies, irrigation, flood control, and soil erosion. (See statement on Oceanographers, sometimes classified as geophysical scientists, elsewhere in the *Handbook*.)

Geophysicists involved in the atmosphere investigate the earth's

magnetic and electric fields and compare its outer atmosphere with those of other planets. *Geomagneticians* study the earth's magnetic field. *Paleomagneticians* learn about past magnetic fields from rocks or lava flows. *Planetologists* study the composition and atmosphere of the moon, planets, and other bodies in the solar system. They gather data from geophysical instruments placed on inter-planetary space probes or equipment used by astronauts during the Apollo missions. *Meteorologists* are sometimes classified as geophysical scientists. (See statements on Meteorologists and Mining elsewhere in the *Handbook*.)

Places of Employment

More than 8,000 people worked as geophysicists in 1972. Most work in private industry, chiefly for petroleum and natural gas companies. Other geophysicists are in mining companies, exploration and consulting firms, and research institutes. A few are independent consultants and some do geophysical prospecting on a fee or contract basis.

Geophysicists are employed in many southwestern and western States, including the Gulf Coast, where large oil and natural gas fields are located. Some geophysicists are employed by American firms overseas for varying periods of time.

Over 2,000 geophysicists, geodesists, and hydrologists worked for Federal Government agencies in 1972, mainly the U.S. Geological Survey; the National Oceanic and Atmospheric Administration (NOAA); the Army Map Service; and the Naval Oceanographic Office. Other geophysicists work for colleges and universities, State governments, and nonprofit research institutions.



Geophysicists measure solar radiation.

Training, Other Qualifications, and Advancement

A person with a bachelor's degree in geophysics or a geophysical specialty qualifies for most beginning jobs in exploration geophysics. A bachelor's degree in a related field of science or engineering also is adequate preparation, provided the person has courses in geophysics, physics, geology, mathematics, chemistry, and engineering. A geophysicist with a background in electronic data processing can increase his employment opportunities in industry and government.

Geophysicists doing research or supervising exploration activities should have graduate training in geophysics or a related science. Those planning to teach in colleges or do basic research should acquire a Ph.D. degree in geophysics or a related science with advanced courses in geophysics.

About 50 colleges and universities award the bachelor's degree in geophysics. Other programs offering training for beginning geophysicists include geophysical technology, geophysical engineering, engineering geology, petroleum geology, and geodesy.

More than 60 universities grant the master's and Ph.D. degree in geophysics. People who have a bachelor's degree and courses in geology, mathematics, physics, engineering or a combination of these subjects can be admitted to these graduate schools.

Geophysicists should be in good health since they often have to work outdoors, and must be willing to travel, sometimes for extended periods of time. Geophysicists generally work as part of a team. They should have curious and analytical minds for solving complex geophysical problems and be able to express themselves both orally and in writing.

Most new geophysicists begin their careers doing field mapping or other exploration activities. Some assist senior geophysicists in research laboratories. With suitable experience, geophysicists advance to project leader, program manager, or other management and administrative jobs.

Employment Outlook

New graduates in geophysics should have good employment opportunities through the mid-1980's. In addition to opportunities resulting from the very rapid growth expected in this field, a few hundred geophysicists will be needed each year to replace those who transfer to other fields of work, retire, or die. Although the number of job openings for geophysicists is not expected to be large in any one year, the number of new geophysics graduates is not expected to meet requirements.

Federal Government agencies may need geophysicists for new or expanding programs. Jobs for geophysicists in the Federal Government are heavily dependent on funds for research and development in the earth sciences, which are expected to increase through the mid 1980's but at a slower rate than during the 1960's. The Government is expected to support additional research to develop "natural disaster technology" to improve capabilities to control, predict, or reduce destruction from fires, earthquakes, floods, hurricanes, and severe storms. The Government also may support research to locate more natural resources, prevent environmental degradation through better land use, and improve municipal services such as water and sewage disposal.

Petroleum and mining companies will need geophysicists for exploration activities, which are expected

to expand through the mid-1980's. As the need for more fuel and minerals grows and costs of exploration increase, more geophysicists will be needed to operate sophisticated electronic equipment to find the more concealed fuel and mineral deposits.

In addition, geophysicists with advanced training will be needed to do research into radioactivity and cosmic and solar radiation, investigate the use of geothermal power (steam from the earth's interior) as a source of energy to generate electricity, and contribute to exploration of outer space. Geophysicists also will be needed to develop better geophysical instruments, and to establish information storage and retrieval systems for geophysical libraries.

Earnings and Working Conditions

Geophysicists have relatively high salaries, with average earnings more than twice those received by non-supervisory workers in private industry, except farming.

Starting salaries in 1972 for geophysics graduates averaged \$9,000 a year for those having a bachelor's degree, \$11,000 for those having a master's degree and \$13,000 for those having a doctorate, according to the American Geological Institute's annual survey.

In the Federal Government in early 1973, geophysicists having a bachelor's degree could begin at \$7,694 or \$9,520 a year, depending on their college records. Beginning geophysicists having a master's degree could start at \$9,520 or \$11,614 depending on their academic record or previous work experience. Those having a Ph.D. degree could begin at \$13,996 or \$16,682.

Geophysicists work outdoors for extended periods of time with limited companionship. Some of them

work in remote areas, involving much traveling and living under primitive conditions. Geophysicists also work in modern, well-equipped, well-lighted laboratories and offices.

Sources of Additional Information

General information on career opportunities, training, and earnings for geophysicists is available from:

American Geophysical Union, 1707 L St. NW., Washington, D.C. 20036.

Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, Okla. 74101.

For information on Federal Government careers contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St., NW., Washington, D.C. 20415.

METEOROLOGISTS

(D.O.T. 025.088)

Nature of the Work

Meteorology is the study of the atmospheres—the gases that surround the earth and other celestial bodies. Meteorologists describe and try to understand the atmospheres' physical composition, motions, and processes, and determine the way these elements affect the rest of our physical environment. This study helps solve many practical problems in agriculture, transportation, communications, health, defense, and business.

Meteorologists usually specialize in one branch of the science. Weather forecasters, known professionally as *synoptic meteorologists*, are the largest group of specialists. They study current weather information, such as air pressure, temperature, humidity, and wind velocity in order to make

short- and long-range predictions. Their data come from weather satellites and observers in many parts of the world. Although some forecasters still prepare and analyze weather maps, most data now are plotted by computers.

Some meteorologists are engaged in basic and applied scientific research. For example, *physical meteorologists* study the chemical and electrical properties of the atmosphere. They do research on the effect of the atmosphere on transmission of light, sound, and radio waves, as well as factors affecting formation of clouds, rain, snow, and other weather conditions. Other meteorologists, known as *climatologists*, study historical climate conditions and analyze past records on wind, rainfall, sunshine, and temperature to determine the general pattern of weather that makes up an area's climate. These studies are useful in planning heating and

cooling systems, designing buildings, and aiding in effective land utilization.

Meteorological instrumentation specialists develop the devices that measure, record, and evaluate data on atmospheric processes. For example, some of these instruments are used to measure the size and number of droplets in a cloud, structure of winds, and pressure, humidity, and temperature miles above the earth.

Specialists in applied methodology, sometimes called *industrial meteorologists*, study the relationship between weather and specific human activities, biological processes, and agricultural and industrial operations. For example, they make weather forecasts for individual companies, attempt to induce rain or snow in a given area, and work on problems such as smoke control and air pollution abatement.

About one-third of all civilian



Meteorologist checks the position of a major storm from weather satellite photographs.

meteorologists work primarily in weather forecasting, and another one-fourth manage or administer forecasting and research programs. Almost one-fourth work in research and development. For example, they devise mathematical models of atmospheric motion to understand and predict changing weather conditions, or carry out experiments in changing the amount of rain in an area.

Some meteorologists teach or do research—frequently combining both activities—in colleges and universities. In colleges without separate departments of meteorology, they may teach geography, mathematics, physics, chemistry, or geology, as well as meteorology.

Places of Employment

About 5,000 persons—10 percent of them women—worked as meteorologists in 1972. In addition to these civilian meteorologists, more than 2,000 officers and 7,000 enlisted members of the Armed Forces did forecasting and other meteorological work.

The largest employer of civilians was the National Oceanic and Atmospheric Administration (NOAA), where nearly 2,000 meteorologists worked at 300 stations in all parts of the United States, and in a small number of foreign areas. The Department of Defense employed over 300 civilian meteorologists.

More than 1,000 meteorologists worked for private industry. Commercial airlines employed several hundred to forecast weather along flight routes and to brief pilots on atmospheric conditions. Others worked for private weather consulting firms, for companies that design and manufacture meteorological instruments, for radio and television stations, and for large firms in aerospace, insurance, utilities, and

other industries.

Colleges and universities employed almost 1,000 meteorologists in research and teaching. A few worked for State and local governments and for nonprofit organizations.

Although meteorologists work in all States, nearly two-fifths live in just two States—California and Maryland. More than one-tenth of all meteorologists worked in the Washington, D.C. area.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in meteorology is the usual minimum requirement for beginning jobs in weather forecasting. However, a bachelor's degree in a related science or engineering, along with some courses in meteorology, is acceptable for some jobs. For example, the Federal Government's minimum requirement for beginning jobs is a bachelor's degree with at least 20 semester hours of study in meteorology and additional training in physics and mathematics, including calculus.

For research and college teaching and for many top-level positions in other meteorological activities, an advanced degree is essential, preferably in meteorology. However, people with graduate degrees in other sciences also may qualify if they have advanced courses in meteorology, physics, mathematics, and chemistry.

In 1972, 42 colleges and universities offered a bachelor's degree in meteorology; 53 schools offered advanced degrees in atmospheric science. Many other institutions offered some courses in meteorology.

The Armed Services give and support meteorological training, both of enlisted personnel for undergraduate education and of officers for advanced study.

NOAA has a program under which some of its meteorologists may attend college for advanced or specialized training. College students can obtain summer jobs with this agency or enroll in its cooperative education program in which they work at NOAA part of the year and attend school part of the year. In addition to helping students finance their education this program gives them valuable experience for finding a job when they graduate.

Meteorologists in the Federal Government usually start in 2-year training positions at weather stations. They observe weather conditions, receive training in forecasting, and release weather information to the public, agriculture industry, airlines, and other specialized users. Advancement is to assistant forecaster and forecaster.

Airline meteorologists have somewhat limited opportunities for advancement. However, after considerable work experience, they may advance to flight dispatcher or to various supervisory or administrative jobs. A few very well qualified meteorologists with a background in science, engineering, and business administration may establish their own weather consulting services.

Employment Outlook

Employment of meteorologists is expected to grow moderately through the mid-1980's. In addition to openings resulting from growth, some meteorologists will be needed each year to replace those who retire, die, or transfer to other fields. Employment opportunities should be favorable during this period, especially for those with advanced degrees who will find jobs in research, teaching in colleges and universities, as well as in management and consulting work.

The use of weather satellites,

manned spacecraft, world-circling weather balloons, and electronic computers has expanded the work of meteorologists. These advances have made possible the study of weather and climate on a global scale. Meteorologists also will find jobs developing and improving instruments for collecting and processing weather data.

Job opportunities for meteorologists with commercial airlines, weather consulting services, and other private companies are expected to increase as the value of weather information to all segments of our economy receives further recognition. For example, the atmosphere is an important part of our environment, and increasing public concern about ecology could create job openings with private research organizations, in colleges and universities, and in State and local governments.

The need will continue for meteorologists to work in existing programs, such as weather measurements and forecasts and do research on problems of severe storms, turbulence, and air pollution.

Earnings and Working Conditions

Meteorologists have relatively high earnings, salaries were about twice the average received by non-supervisory workers in private industry, except farming.

In early 1973, meteorologists in the Federal Government with a bachelor's degree and no experience received starting salaries of \$7,619 or \$9,520 a year, depending on their college grades. Those with a master's degree could start at \$11,614 or \$13,996, and those with the Ph.D. degree at \$13,996 or \$16,682. Salaries were higher for those who worked outside the United States.

Airline meteorologists had average starting salaries of \$12,000 a

year, according to the Air Traffic Conference. They generally receive the same benefits as other airline employees. (See Statement on Occupations in Civil Aviation elsewhere in the *Handbook*.) Those teaching in colleges and universities earned salaries equivalent to those received by other faculty members. (See Statement on College and University Teachers.)

Jobs in weather stations, which are operated on a 24-hour, 7-day week basis, often involve nightwork and rotating shifts. Most stations are at airports or at places in or near cities; some are in isolated and remote areas. Meteorologists generally work alone in smaller weather stations, and as part of a team in larger ones.

Sources of Additional Information

General information on career opportunities and schools offering education in meteorology is available from:

American Meteorology Society, 45
Beacon St., Boston, Mass. 02108.

American Geophysical Union, 2100
Pennsylvania Ave., NW., Wash-
ington, D.C. 20037.

For facts about job opportunities with the NOAA National Weather Service and on its student cooperative education program, contact:

Personnel Division AD 41, National
Oceanic and Atmospheric Adminis-
tration, 6010 Executive Blvd., Rock-
ville, Md. 20852.

Details about Air Force meteorological training programs are available from any Air Force recruiting office or from:

Air Weather Service/D.O.T., Stop 400
Scott Air Force Base, Ill. 62225.

OCEANOGRAPHERS

(D.O.T. 024.081 and 041.081)

Nature of the Work

Oceans cover more than two-thirds of the earth's surface and provide people with valuable foods, fossil fuels, and minerals. They also influence the weather, serve as a "highway" for transportation, and offer many kinds of recreation. Oceanographers use the principles and techniques of natural science, mathematics, and engineering to study oceans—their movements, physical properties, and plant and animal life. Their research not only extends basic scientific knowledge, but also helps develop practical methods for forecasting weather, developing fisheries, mining ocean resources, and improving National defense.

Some oceanographers make tests and observations, and conduct experiments from ships or stationary platforms in the sea. They may study and collect data on ocean tides, currents, and other phenomena. Some study undersea mountain ranges and valleys, oceanic interaction with the atmosphere, and layers of sediment on and beneath the ocean floor.

Oceanographers also work in laboratories on land where, for example, they measure, dissect, and photograph fish. They also study exotic sea specimens and plankton (floating microscopic plants and animals). Much of their work entails identifying, cataloguing, and analyzing different kinds of sea life and minerals. At other laboratories, oceanographers plot maps or feed data to computers to test theories about the ocean. For example, they may study and test the theory of continental drift, which states that the continents were once joined together, have

drifted apart, and continue to drift apart causing the sea floor to spread. To present the results of their studies, oceanographers prepare charts, tabulations, reports and manuals, and write papers for scientific journals.

Oceanographers explore and study the ocean with low-flying aircraft as well as surface ships. They use specialized instruments to measure and record the findings of their explorations and studies. Special cameras equipped with strong lights photograph marine life and the ocean floor. Sounding devices are

vital to the oceanographer for communicating with teammates above the water and for measuring, mapping, and locating ocean materials.

Most oceanographers specialize in one branch of the science. *Biological oceanographers* (marine biologists) study plant and animal life in the ocean. They search for ways to extract drugs from seaweeds or sponges, investigate life processes of marine animals, and determine the effects of radioactivity and pollution on the growth of fish. *Physical oceanographers*

(physicists and geophysicists) study the physical properties of the ocean. Their research on the relationships between the sea and the atmosphere may lead to control over the weather. *Geological oceanographers* (marine geologists) study the ocean's mountain ranges, rocks, and sediments. Locating deposits of minerals, oil, and gas on the ocean floor is an application of their work. *Chemical oceanographers* investigate the chemical composition of ocean water and sediments as well as chemical reactions in the sea. One practical area of their study is the removal of salt from sea water. *Oceanographic engineers* and *electronic specialists* design and build instruments for oceanographic research and operations. They also lay cables, supervise underwater construction, and locate sunken ships to recover their cargos.

Almost two of every three oceanographers perform or administer research and development activities. Many teach in colleges and universities. A few are engaged in technical writing, in consulting, and in administering activities other than research.

Places of Employment

About 4,500 people—about 5 percent of them women—worked as oceanographers in 1972. About one-third worked in colleges and universities, one-third in private industry, and one-fourth for the Federal Government. Federal agencies employing substantial numbers of oceanographers include the Naval Oceanographic Office, and the National Oceanic and Atmospheric Administration (NOAA). Some oceanographers work for firms designing and developing instruments and vehicles for oceanographic research. A few work for



Oceanographers get ready to lower test instrument.

fishery laboratories of State and local governments.

Training, Other Qualifications, and Advancement

The minimum requirement for beginning professional jobs in oceanography is a bachelor's degree with a major in oceanography, biology, earth or physical sciences, mathematics, or engineering. Professional jobs in research, teaching, and high-level positions in most other types of work require graduate training in oceanography or a basic science.

Only 46 colleges and universities offered undergraduate degrees in oceanography or marine sciences in 1972. However, since oceanography is an interdisciplinary science, training in a basic science and a strong interest in oceanography may be adequate preparation for some beginning jobs or for entry to graduate school.

Important college courses for oceanographers include mathematics, physics, chemistry, geophysics, geology, meteorology and biology. In general, students should specialize in the particular science that is closest to their area of oceanographic interest. For example, students interested in chemical oceanography could obtain a degree in chemistry.

In 1972 about 85 colleges offered advanced degrees in oceanography and marine sciences. In graduate schools, students take advanced courses in oceanography and in a basic science.

Graduate students usually work part of the time aboard ship, doing oceanographic research and becoming familiar with the sea and with techniques used to obtain oceanographic information. Universities at the various stations along our coasts offer summer courses for both graduates and undergraduate

students, which are especially beneficial for students from inland universities. Oceanographers should have the curiosity needed to do new research and the patience to collect data and conduct experiments.

Beginning oceanographers with the bachelor's degree usually start as research or laboratory assistants, or in jobs involving routine data collection, analysis, or computations. Most beginning oceanographers receive on-the-job training related to the specific work at hand. The extent of the training varies with the background and needs of the individual.

Experienced oceanographers may direct surveys and research programs or advance to administrative or supervisory jobs in research laboratories.

Employment Outlook

Job opportunities for oceanographers with a Ph.D. are expected to be favorable through the mid-1980's, especially for those who specialize in ocean engineering. People with less education may face competition for beginning jobs and find other opportunities limited to doing routine analytical work as research assistants.

In addition to openings from the rapid growth expected in this field, some oceanographers will be needed each year to replace those who die, retire, or transfer to other fields.

Growing recognition of the importance of the oceans to the Nation's welfare and security has heightened interest in oceanography and has opened new fields for specialists. More oceanographers will be needed to improve methods of taking foods and drugs from the oceans, manage fisheries, and develop economical means to harness the ocean for energy and provide

fresh water from the sea. Some will be needed to develop new technologies for discovering and mining the fuel and mineral resources of the ocean's floor and to protect water from pollution and shoreline from damage by waves and tides. Still others will be needed for weather and iceberg forecasting and to study air-sea interaction for long-range weather forecasts. The Federal Government finances most oceanographic research and development; employment opportunities could be affected by changes in Federal spending priorities.

In the years ahead, improving the Nation's defenses against submarines and surface vessels will require oceanographic research into underwater sound, surface and subsurface currents, and the shape of the ocean floor. New super tankers will require the building of new large ports and will create jobs for oceanographers who specialize in ocean engineering.

Teaching opportunities in colleges and universities may expand as interest in oceanography grows.

Earnings and Working Conditions

Oceanographers have relatively high earnings; average salaries were about twice the average received by nonsupervisory workers in private industry, except farming.

In early 1973, oceanographers in the Federal Government with the bachelor's degree received starting salaries of \$7,619 or \$9,520 a year, depending on their college grades. Those with the master's degree could start at \$11,614 or \$13,996; and those with the Ph.D. degree at \$13,996 or \$16,682.

In private industry in 1972, new graduates with the bachelor's degree received average starting salaries of \$9,000 a year, according to the American Geological Institute. Those with the master's

degree could start at \$11,000; and those with the Ph.D. at \$13,000.

Beginning oceanographers in educational institutions generally receive the same salaries as other faculty members. (See statement on College and University Teachers elsewhere in the *Handbook*.) In addition to regular salaries, many experienced oceanographers earn extra income from consulting, lecturing, and writing.

Oceanographers engaged in research that requires sea voyages are frequently away from home for weeks or months at a time. Sometimes they live and work in cramped quarters. People who like the sea, however, may find these voyages satisfying.

Sources of Additional Information

For information about careers

in oceanography and about colleges and universities that offer training in marine science, contact:

National Oceanic and Atmospheric Administration, 6001 Executive Boulevard, Rockville, Maryland 20852. Attention: AD 411

Federal Government career information is available from any regional office of the U.S. Civil Service Commission or from:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E. Street, NW., Washington, D.C. 20390.

The booklet, *Training and Careers in Marine Science*, is available for 50 cents from:

International Oceanographic Foundation, 10 Rickenbacker Causeway, Virginia Key, Miami, Fla. 33149.

A booklet, *Oceanography Information Sources '73*, lists the names and addresses of industrial

organizations involved in oceanography and publishers of oceanographic educational materials, journals, and periodicals. Copies may be purchased for \$2.50 from:

Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Ave., NW., Washington, D.C. 20418.

Some information on Oceanographic specialties is available from professional societies listed elsewhere in the *Handbook*. (See statements on Geologists, Geophysicists, Life Scientists, Meteorologists, and Chemists elsewhere in the *Handbook*.)

LIFE SCIENCE OCCUPATIONS

Life scientists study living organisms and their life processes. They are concerned with the origin and preservation of life, from the largest animal to the smallest living cell. The number and variety of plants and animals are so vast, and their processes so varied and complex, that life scientists usually work in one of the three broad areas—agriculture, biology, or medicine.

Life scientists perform research to expand knowledge, teach, or apply scientific theories to the solution of practical problems. New drugs, special varieties of plants, and a cleaner environment can result from the work of life scientists.

This chapter discusses life scientists as a group, since they receive comparable basic training and have roughly similar employment and earning prospects. Brief descriptions are provided about the nature of the work of a number of life scientists—including botanists, zoologists, and microbiologists. This section also contains separate statements on biochemists and soil scientists.

BIOCHEMISTS

(D.O.T. 041.081)

Nature of the Work

Biochemists play an important role in the search for the basis of life and what sustains it. Their professional interests range from determining the effects of heredity on life processes to learning how living things react to space travel.

Biochemists study the chemical

composition of organisms and the changes caused by genetic and environmental factors. They analyze the chemical processes related to biological functions, such as muscular contraction, reproduction, and metabolism. Biochemists also investigate the effects on organisms of substances such as foods, hormones, and drugs.

The methods and techniques of biochemistry are applied to areas such as medicine or agriculture. For instance, biochemists may develop diagnostic procedures or find cures for diseases or identify the nutrients necessary to maintain good health. To improve agricultural harvests they may develop pest-control agents or fertilizers.

More than 3 out of 4 biochemists work in basic and applied research activities. The distinction between basic and applied research is often one of degree and biochemists may do both types. Most, however, are in basic research. The few doing strictly applied research use the

results of basic research for practical uses. For example, the knowledge of how an organism forms a hormone is used to develop a process for synthesizing the hormone and producing it on a mass scale.

Laboratory research involves weighing, filtering, distilling, drying, and culturing (growing microorganisms) ingredients. Some experiments also require sophisticated tasks such as designing and constructing chemical apparatus or performing tests using radioactive tracers. Biochemists use a variety of instruments including electron microscopes, and may devise new instruments and techniques as needed. They usually report the results of their research in scientific journals or before scientific groups.

Some biochemists combine research with teaching in colleges and universities. A few work in industrial production and testing activities.

Places of Employment

About 12,500 biochemists were employed in the United States in 1972. Although the exact number of women working in the profession is not known, nearly one-fourth of those receiving advanced degrees in biochemistry in recent years have been women.

More than half of all biochemists are employed in colleges and universities, and most do basic and applied research and development in university-operated laboratories and hospitals. Nonprofit research institutes and foundations employ some biochemists. Many biochemists work in private industry, primarily in companies manufacturing drugs, insecticides, and cosmetics. Biochemists also work in Federal, State, and local government agencies. Most do research for Federal agencies concerned with health and agricultural problems. A few are



Biochemists determine how living things react to space travel.

self-employed consultants to industry and government.

Training, Other Qualifications, and Advancement

The minimum educational requirement for many beginning jobs as a professional biochemist, especially in research or teaching, is an advanced degree. Graduate training is necessary for advancement to many management or administrative jobs. A bachelor's degree with a major in biochemistry or chemistry, or with a major in biology and a minor in chemistry, may qualify some persons for entry jobs as research assistants or technicians.

More than 40 schools award the bachelor's degree in biochemistry, and nearly all colleges and universities offer a major in biology or chemistry. Regardless of their college major, future biochemists should take undergraduate courses in chemistry, biology, biochemistry, mathematics, and physics.

About 200 colleges and universities offer graduate degrees in biochemistry. Graduate students generally are required to have a bachelor's degree in biochemistry, biology, or chemistry. These students take advanced courses in biochemistry or a specialty of the field. For example, a university affiliated with a medical school or hospital may have facilities to study the biochemistry of diseases. Therefore, students wishing to specialize should select their schools carefully. Graduate training requires actual research in addition to advanced science courses. For the doctoral degree, the student specializes in one field of biochemistry by doing intensive research and writing a thesis.

Young people planning careers as biochemists should be able to work independently or as part of a team. Precision, keen powers of observation,

and mechanical aptitude also are important. Biochemists should have analytical abilities and curious minds, as well as the patience and perseverance needed to complete the hundreds of experiments that may be necessary to solve one problem.

Graduates with advanced degrees may begin their careers as teachers or researchers in colleges or universities. In private industry, most begin in research jobs and with experience may advance to administrative positions.

New graduates with a bachelor's degree usually start work as research assistants or technicians. These jobs in private industry often involve testing and analysis. In the drug industry, for example, research assistants analyze the ingredients of a product to verify and maintain its purity or quality.

Employment Outlook

Job opportunities for biochemists with advanced degrees should be favorable through the mid-1980's. In addition to opportunities resulting from the rapid growth expected in this field, hundreds of openings will become available each year to replace those who die, retire, or transfer to other occupations.

Increased research and development expenditures in the life sciences, primarily by the Federal Government, are major factors contributing to the anticipated growth in this field. For example, the great urgency to find cures for cancer, heart disease, muscular dystrophy, and other illnesses should stimulate requirements for biochemists. Additional biochemists will find jobs in hospitals and health centers using automated biochemical tests for diagnoses. An increasing number also will be needed to implement stricter drug standards established

by Federal regulatory agencies. Biochemistry also is important in other areas of public concern such as environmental protection.

Growing college enrollments in chemistry and the life sciences will add to the demand for biochemists to teach in colleges and universities.

Earnings and Working Conditions

Biochemists have relatively high salaries; average earnings were about twice the average received by all nonsupervisory workers in private industry, except farming. According to a 1972 survey of the American Chemical Society, salaries for biochemists with 2 to 4 years of experience averaged \$8,800 for those with a bachelor's degree; \$10,800 for those with a master's degree; and \$12,500 for those with a Ph.D. Biochemists also can look forward to higher salaries as they gain experience. Those who had 10 to 14 years of experience averaged \$13,500 with a bachelor's degree, \$15,000 with a master's degree, and \$19,200 with a Ph.D. degree.

Starting salaries paid to biochemists employed by colleges and universities are comparable to those for other professional faculty members. Biochemists in educational institutions often supplement their incomes by engaging in outside research or consulting work.

Sources of Additional Information

General information on careers in biochemistry may be obtained from:

American Society of Biological Chemists, 9650 Rockville Pike, Bethesda, Md. 20014.

LIFE SCIENTISTS

(D.O.T. 040.081, 041.081, 041.168,
041.181, 041.281)

Nature of the Work

Life scientists study all aspects of living organisms, emphasizing the relationship between animals, plants, and microorganisms, and their environments.

Almost two-fifths of all life scientists are in research and development. Many work in laboratories conducting basic research aimed at adding to our knowledge of living organisms. Knowledge gained from this research frequently is applied to—and has resulted in the development of—insecticides, disease-resistant crops, and medicines. When

working in laboratories, life scientists must be familiar with research techniques and complex laboratory equipment such as electron microscopes. Knowledge of computers also is useful in conducting some experiments. Not all research, however, is performed in laboratories. For example, a botanist who explores the volcanic Alaskan valleys, to see what plants grow there, also is doing research.

Teaching in a college or university is the major area of work for more than one-fourth of all life scientists, many of whom also do independent research. Another fourth are in some type of management and administrative work that ranges from planning and administering programs for testing foods and drugs to directing activities at zoos

or botanical gardens. Some life scientists work as consultants to business firms or government in their specialty areas. Others write for technical publications or test and inspect foods, drugs, and other products. Some work in technical sales and services jobs for industrial companies where, for example, they demonstrate the proper use of new chemicals or technical products.

Scientists working in many areas of the life sciences often call themselves *biologists*. However, the majority are classified by the type of organism they study or by the specific activity performed.

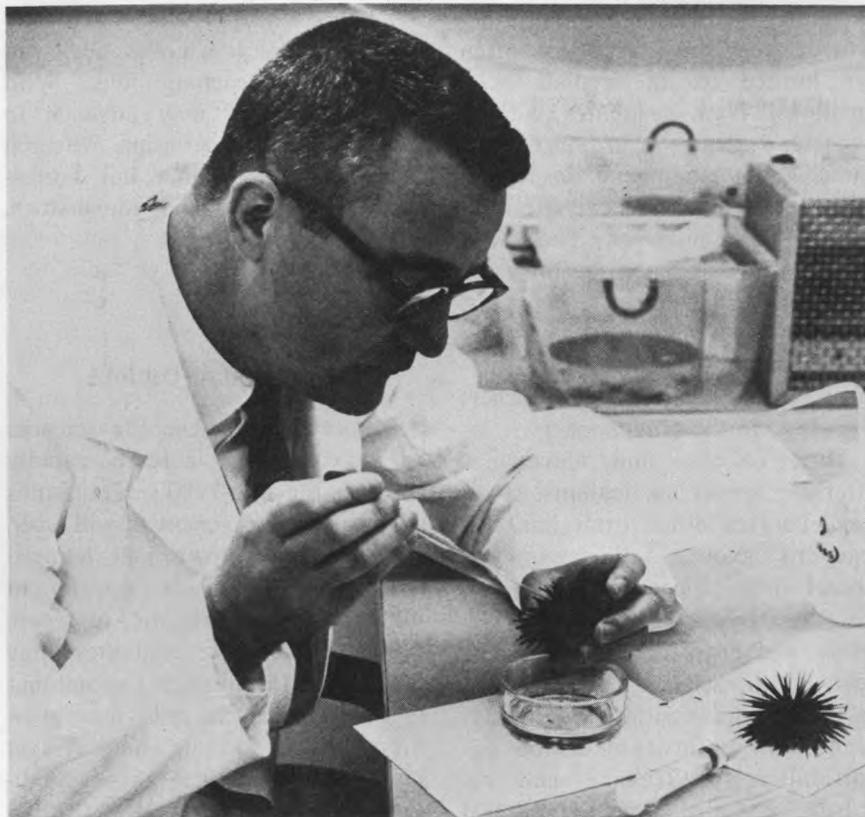
Life scientists dealing primarily with plants are *botanists*. Some study all aspects of plant life, while others work in defined areas such as identifying and classifying plants or studying the structure of plants and plant cells. Some botanists concentrate on the cause and cure of plant diseases.

Some life scientists are concerned with the mass development of plants. For example, *agronomists* improve the quality and yield of crops by developing new growth methods or by controlling disease, pests, and weeds. They also analyze soils to determine ways of increasing acreage yields and decreasing soil erosion. *Horticulturists* work with orchard and garden plants such as fruits, nuts, vegetables, and flowers. They develop new or improved plant varieties, and better methods of growing, harvesting, and transporting crops.

Zoologists concentrate on animal life—its origin, behavior, and life processes. Some conduct experimental studies with live animals and others examine dissected animals in laboratories. Zoologists are usually identified by the animal group studied—ornithologists (birds), herpetologists (reptiles and amphibians), and mammalogists (mammals).



Life scientists must be familiar with fundamental research techniques.



Life scientist induces sea urchin to shed "eggs" for experiment in outer space.

Animal husbandry specialists do research on the breeding, feeding, and diseases of domestic farm animals. *Veterinarians* study diseases and abnormal functioning in animals. (See statement on Veterinarians elsewhere in the *Handbook*.)

Life scientists who investigate the growth and characteristics of microscopic organisms such as bacteria, viruses, and molds are called *microbiologists*. They isolate organisms and make cultures for close examination under a microscope. *Medical microbiologists* are concerned with problems such as the relationship between bacteria and disease or the effect of antibiotics on bacteria. Others specialize in soil bacteriology (effect of microorganisms on soil fertility), virology (viruses), or immunology (mechanisms that fight infections).

Anatomists study the composi-

tion of organisms, from cell structure to the formation of tissues and organs. Many specialize in human anatomy. Examination may entail dissections or involve the use of electron microscopes for organisms of submicroscopic size.

Some life scientists apply their specialized knowledge across different areas, and may be classified by the functions performed. *Ecologists*, for example, study the mutual relationship among organisms and their environments. They are interested in the effects of environmental influences such as rainfall, temperature, and altitude on organisms. For example, ecologists extract samples of phytoplankton (microscopic plants that produce oxygen) from bodies of water to determine the effects of pollution, and measure the radioactive content of fish by tracing

tagged elements as they pass through their systems.

Embryologists study the development of an organism from a fertilized egg through the hatching process or gestation period. They investigate the cause of healthy and abnormal development in organisms.

Nutritionists examine the bodily processes through which food is utilized and transformed into energy. They learn how vitamins, minerals, proteins, and other nutrients build and repair tissues.

Pharmacologists conduct tests on animals such as rats, guinea pigs, and monkeys to determine the effects of drugs, gases, poisons, dusts, and other substances on the functioning of tissues and organs. They may develop new or improved chemical compounds for use in drugs and medicines.

Pathologists specialize in the effects of diseases, parasites, and insects on human cells, tissues, and organs. Others may investigate genetic variations caused by drugs.

Biochemists and Biological Oceanographers, which are also life scientists, are included in separate statements elsewhere in the *Handbook*.

Places of Employment

More than 180,000 persons worked as life scientists in 1972. Almost 55,000 worked as agricultural scientists, about 75,000 as biological scientists, and more than 55,000 worked on problems related to medical science. Over one-third of all biologists and about eight percent of all agricultural scientists are women.

Colleges and universities employ nearly three-fifths of all life scientists in both teaching and research jobs. Medical schools and hospitals also employ large numbers of medical investigators. Sizable numbers of agronomists,

horticulturists, animal husbandry specialists, entomologists, and other agriculture-related specialists work for State agricultural colleges and agricultural experiment stations.

More than half of the 26,000 life scientists working for the Federal Government in 1972 were in the Department of Agriculture. The Department of the Interior employs most of the fish and wildlife biologists working for the Federal Government. Other large numbers of life scientists work for the Department of the Army and the National Institutes of Health. State and local governments combined employ 9,000 biologists—mostly fish and wildlife specialists, microbiologists, and entomologists—to detect and control diseases and to work in conservation.

Approximately 25,000 life scientists work in private industry, mostly in pharmaceuticals, industrial chemicals, and food processing industries. A few are self-employed and more than 4,000 work for nonprofit research organizations and foundations.

More than one-third of all life scientists live in six States—California, New York, Illinois, Pennsylvania, Florida, and Maryland.

Training, Other Qualifications, and Advancement

Young people seeking a career in the life sciences should plan to obtain an advanced degree, preferably a Ph.D., in their field of interest. The Ph.D. degree generally is required for college teaching and for independent research. It is also necessary for many jobs administering research programs. New graduates who have master's degrees may qualify for some beginning jobs in applied research and college teaching.

The bachelor's degree may be

adequate preparation for some beginning jobs, but promotions often are limited to intermediate level positions. New graduates with a bachelor's degree can start their careers in testing and inspecting jobs, or become technical sales and service representatives. They also may become advanced technicians, particularly in medical research or, with courses in education, a high school biology teacher. (See statement on Secondary School Teachers elsewhere in the *Handbook*.)

Most colleges and universities offer life science curriculums. However, courses differ from one college to another. For example, liberal arts colleges and universities emphasize the biological sciences and medical research. The agricultural sciences are stressed at State universities and land-grant colleges because of the opportunities for training and research provided by agricultural experiment stations.

Young people seeking careers in the life sciences should obtain the broadest possible undergraduate background in biology and other sciences. Courses taken should include biochemistry, organic and inorganic chemistry, physics, and mathematics. Statistics, calculus, biometrics, and computer programming courses also are useful.

Large numbers of colleges and universities confer advanced degrees in the life sciences. Requirements for advanced degrees usually include field work and laboratory research, as well as classroom studies and preparation of a thesis.

Young people planning careers as life scientists should be able to work independently, or as part of a team. Physical stamina and an inquiring mind are necessary for those interested in research in remote places. Life scientists must be able to express ideas both orally and in writing.

Life scientists who have advanced degrees usually begin in research or teaching jobs. With experience, they may advance to jobs such as supervising research programs, or become full professors in colleges and universities.

Employment Outlook

Employment in the life sciences is expected to increase rapidly through the mid-1980's. Thousands of jobs for life scientists will open because of this growth and the need to replace those who transfer to other fields of work, die, or retire. Nevertheless, new graduates may face competition since the number of life science graduates may grow more rapidly than employment opportunities. Under these conditions, those holding advanced degrees, especially the Ph.D., should face less competition for jobs than those who have bachelor's degrees. Opportunities for those with only an undergraduate degree may be limited to research assistant or technician jobs.

Continued growth in research and development, particularly medical research programs sponsored by the Federal Government and voluntary health agencies, is a major reason for the expected increase in the employment of life scientists. For example, the Federal Government is expected to allocate substantial expenditures for cancer research during the next few years. Other areas of concentrated medical study include heart disease and birth defects. Research in such relatively new areas as space biology, radiation biology, environmental health, and genetic regulation will probably increase also. In addition, industry is expected to increase its research



Life scientists conduct experimental studies with animals.

and development spending in the biological sciences.

Stringent Federal health regulations are likely to require additional life scientists in industry to test new drugs, chemicals, or foods, and to change processing methods.

The large college and university enrollments expected in the life sciences through the mid-1980's should increase the demand for Ph.D.'s as teachers. It also should result in openings for qualified persons with master's degrees, especially in community colleges.

Earnings and Working Conditions

Agricultural and biological scientists both command relatively high salaries. Their average earn-

ings are more than twice those received by nonsupervisory workers in private industry, except farming.

In the Federal Government in early 1973, life scientists having a bachelor's degree could begin at \$7,694 or \$9,520 a year, depending on their college records. Beginning life scientists having the master's degree could start at \$9,520 or \$11,614, depending on their academic records or previous work experience. Those having the Ph.D. degree could begin at \$13,996 or \$16,682.

Salaries for 9 months of teaching in 4-year colleges averaged about \$9,300 for instructors, and \$11,500 for assistant professors. More experienced personnel earned between \$14,000 (associate profes-

sors) and \$18,000 (professors) a year. (See statement on College and University Teachers.) Life scientists in educational institutions sometimes supplement their regular salaries with income from writing, consulting, and special research projects.

Beginning salary offers in 1972 for agricultural scientists averaged approximately \$8,300 a year for those having bachelor's degrees, and \$10,600 for those having a graduate degree. According to the College Placement Council, agricultural scientists averaged \$8,700 a year to start in the chemical industry, the largest employer of life scientists in private industry. Another large employer of life scientists, the food industry, paid agricultural scientists beginning salaries of \$8,500 in 1972.

During 1972, life scientists in research and development in all sectors earned average monthly salaries of \$1,023 at the bachelor's degree level, \$1,215 at the master's level, and \$1,533 at the Ph.D. level, according to one national survey.

Most life scientists work in well-lighted, well-ventilated, and clean laboratories. Some jobs require working outdoors under extreme weather conditions and doing strenuous physical work for long periods of time. Some jobs require living in remote areas without modern conveniences.

Sources of Additional Information

General information on careers in the life sciences is available from:

American Institute of Biological Sciences, 3900 Wisconsin Ave., NW., Washington, D.C. 20016.

American Society of Horticultural Science, 914 Main St., P.O. Box 109, St. Joseph, Mich. 49085.

American Physiological Society, Department of Botany, University of North Carolina, Chapel Hill, N.C. 27514.

Ecological Society of America, Department of Botany, University of North Carolina, Chapel Hill, N.C. 27514.

Special information on Federal Government careers is available from:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St., NW., Washington, D.C. 20415.

SOIL SCIENTISTS

(D.O.T. 040.081)

Nature of the Work

Soil scientists study the physical, chemical, and biological characteristics and behavior of soils. They investigate the soils both in the field and in the laboratory and grade them according to a national system of soil classification. From their research, scientists can classify soil in order to respond to management questions concerning its capability to produce crops, grasses, and trees, and concerning the soil's engineering utility in relation to foundations for buildings and other structures. Soil scientists prepare maps, usually based on aerial photographs, on which they plot the individual kinds of soil and other landscape features significant to soil use and management in relation to land ownership lines, field boundaries, roads, and other conspicuous features.

Soil scientists also conduct research to determine the physical and chemical properties of soils in order to understand their behavior and origin. They predict the yields of cultivated crops, grasses, and trees, under alternative combinations of management practices.



Soil scientists test soils in the laboratory.

Soils science offers opportunities for those who wish to specialize in soil classification and mapping, soil geography, soil chemistry, soil physics, soil microbiology, and soil management. Training and experience in soil science also will prepare persons for positions as farm managers, land appraisers, and many other professional positions.

Places of Employment

An estimated 5,000 soil scientists were employed in 1972. Most soil scientists are employed by agencies of the Federal Government, State equipment stations, and colleges of agriculture. However, many are employed in a wide range of other public and private institutions, including fertilizer companies, private research laboratories, insurance companies, banks and other lending agencies, real estate firms, land appraisal boards, State highway departments, State conservation departments, and farm management agencies. A few are independent consultants, and others work for consulting firms. An increasing number are employed in foreign

countries as research leaders, consultants, and agricultural managers.

Training and Advancement

Training in a college or university of recognized standing is important in obtaining employment as a soil scientist. For Federal employment, the minimum qualification for entrance is a B.S. degree with a major in Soil Science or in a closely related field of study, and with 30 semester hours of course work in the biological, physical, and earth sciences, including a minimum of 15 semester hours in soils. Those having graduate training—especially those with the doctorate—can be expected to advance rapidly into a responsible and high-paying position. This is particularly true in soil research, including the more responsible positions in soil classification and in teaching. Soil scientists who are qualified for work with both field and laboratory data have a special advantage.

Many colleges and universities offer fellowships and assistantships for graduate training, or employ graduate students for part-time teaching or research.

Employment Outlook

The demand is increasing for soil scientists to help complete the scientific classification and evaluation of the soil resources in the United States. One of the major program objectives of the Soil Conservation Service of the U.S. Department of Agriculture is to complete the soil survey of all rural lands in the United States.

This program includes research, soil classification, interpretation of results for use by agriculturists and engineers, and training of other workers to use these results. Also,

demand is increasing for both basic and applied research to increase the efficiency of soil use.

Earnings

The incomes of soil scientists depend upon their education, professional experience, and individual abilities. The entrance salary in the Federal service for graduates having a B.S. degree was \$7,694 in early 1973. They may expect ad-

vancement to \$9,520 after 1 year of satisfactory performance. Further promotion depends upon the individual's ability to do high-quality work and to accept responsibility. Earnings of well-qualified Federal soil scientists with several years experience range from \$13,996 to \$23,088 a year.

Sources of Additional Information

Additional information may be

obtained from the U.S. Civil Service Commission, Washington, D.C. 20415; Office of Personnel, U.S. Department of Agriculture, Washington, D.C. 20250; or any office of the Department's Soil Conservation Service.

See also statements on Chemists and Life Scientists.

MATHEMATICS OCCUPATIONS

Mathematics is both a science and a tool essential for many kinds of work. As a tool, mathematics is necessary to understanding and expressing ideas in science, engineering, and, increasingly, in human affairs. The application of mathematical techniques in these fields has increased greatly because of the widespread use of computers, which enable mathematicians to do complex problems rapidly and efficiently. As a result, employment opportunities for persons trained in mathematics have expanded rapidly in recent years.

Young people considering careers in mathematics should be able to concentrate for long periods of time. They should enjoy working independently with ideas and solving problems, and must be able to present their findings in written reports.

This section describes two occupations—mathematician and statistician. A statement on actuaries, a closely related mathematical occupation, is discussed in the section on Insurance Occupations. Entrance into any of these fields requires college training in mathematics. For many types of work, graduate education is necessary.

Many other workers in the natural and social sciences and in data processing use mathematics extensively, although they are not primarily mathematicians. These occupations are discussed elsewhere in the *Handbook*, as are jobs for high school mathematics teachers, covered in the statement on Secondary School Teachers.



Mathematicians use modern computing equipment.

MATHEMATICIANS

(D.O.T. 020.088)

Nature of the Work

Mathematics, one of the oldest and most basic sciences, is also one of the most rapidly growing professions. Mathematicians today are engaged in a wide variety of activities, ranging from the creation of new theories to the translation of scientific and managerial problems into mathematical terms.

There are two broad classes of mathematical work: pure or theoretical mathematics; and applied mathematics, which includes solving numerical problems. Theoretical mathematicians further mathematical science by discovering new principles and new rela-

tionships between existing principles of mathematics. They seek to increase basic knowledge without necessarily considering its practical use. Yet, this pure and abstract knowledge has been instrumental in many scientific and engineering achievements. For example, in 1854 Bernard Riemann invented a seemingly impractical non-Euclidian geometry that became part of the theory of relativity developed by Albert Einstein more than a half-century later.

Mathematicians in applied work develop theories, techniques, and approaches to solve problems in natural science, social science, management, and engineering. They analyze how problems can be expressed in mathematical terms, and use mathematics to help solve these problems. Their work ranges from

the analysis of vibrations and the stability of rockets to studies of the effects of new drugs on disease. Some applied mathematicians, in the field of operations research for example, study problems ranging from finding the way to make the largest profit with the least risk in managing a business, to the timing of traffic lights for optimum use in our highway systems.

Some mathematicians (or mathematical statisticians—as they are often called) use mathematical theory to design and improve statistical methods for collecting and analyzing numerical information, and estimating unknown quantities. They develop statistical tools and frequently work with statisticians to plan and design surveys in fields such as agriculture, biology, economics, psychology, sociology, and industrial quality control.

In applied mathematics, mathematical knowledge and modern computing equipment are used to get numerical answers to specific problems. Some work in this area requires a very high level of mathematical knowledge, skill, and ingenuity. However, much of this work may require training somewhat different from that of the mathematician. (See statements on Programers and Systems Analysts elsewhere in the *Handbook*.)

Almost one-fourth of all mathematicians work in research and development, extending basic knowledge and finding new uses for existing knowledge. Nearly one-third are primarily college teachers, many of whom do some research. A little less than one-third are in management and administration—about two-fifths of whom manage and administer research and development programs. Most of the remainder are concerned chiefly with operations research or production and inspection (quality control) of

manufactured products.

Places of Employment

About 76,000 persons worked as mathematicians in 1972; almost 15 percent were women. More than one-half worked in private industry, primarily in independent research and development firms, and in the ordnance, aircraft, machinery, and electrical equipment industries. Other mathematicians were employed as consultants.

More than one-third of all mathematicians worked for colleges and universities. Some of these persons are teachers, others work mainly in research and development and have few or no teaching duties. Others worked for the Federal Government, primarily in the Department of Defense. A few worked for nonprofit organizations and State and local governments.

Mathematicians work in all States, but are concentrated in those with large industrial areas and large college and university enrollments. Nearly half of the total were in seven States—California, New York, Massachusetts, Pennsylvania, Illinois, Maryland, and New Jersey. One-fifth live in three metropolitan areas—New York; Washington, D.C.; and Los Angeles-Long Beach.

Training, Other Qualifications, and Advancement

The minimum educational requirement for a beginning job in mathematics outside of college teaching is the bachelor's degree with a major in mathematics, or with a major in an applied field—such as physics or engineering—and a minor in mathematics. For many beginning jobs, particularly in research or college teaching, an

advanced degree is required. Graduate study is also valuable for advancement to more responsible positions in all types of work.

The bachelor's degree in mathematics is offered by most colleges and universities throughout the country. Mathematics courses usually required for a degree are analytical geometry, calculus, differential equations, probability and statistics, mathematical analysis, and modern algebra. A person planning to study this field in college should take as many mathematics courses as possible while still in high school.

More than 350 colleges and universities have programs leading to the master's degree in mathematics; about 150 also offer the Ph.D. In graduate school, students build upon the basic knowledge acquired in earlier studies. They usually concentrate on a specific field of mathematics, such as algebra, mathematical analysis, or statistics, by conducting intensive research and taking advanced courses.

The bachelor's degree is adequate preparation for many positions in private industry and the Federal Government, particularly those connected with computer work. Some new graduates having the bachelor's degree assist senior mathematicians by performing computations and solving less advanced mathematical problems in applied research. Others work as graduate research or teaching assistants in colleges and universities while working toward an advanced degree.

Advanced degrees are required for an increasing number of jobs in industry and government—in research and in many areas of applied mathematics. The Ph.D. degree is necessary for full faculty status at most colleges and univer-

sities, as well as for advanced research positions.

For work in applied mathematics, training in the field in which the mathematics will be used is very important. Fields in which applied mathematics is used extensively include physics, engineering, and operations research; other fields are business and industrial management, economics, statistics, chemistry and life sciences, and the behavioral sciences. Training in numerical analysis and programming is especially desirable for mathematicians working with computers.

Mathematicians need good reasoning ability, persistence, and the ability to apply basic principles to new types of problems. They must be able to communicate well with others since they often must listen to a non-mathematician describe a problem in general terms, and check and recheck to make sure they understand the mathematical solution that is needed.

Employment Outlook

Persons seeking beginning jobs as mathematicians are likely to face competition through the mid-1980's. Employment of mathematicians is expected to increase rapidly in this period, and several thousand mathematicians will be needed each year to replace those who die, retire, or transfer to other occupations. However, the number of persons trained in mathematics and looking for jobs in the field is likely to increase even more rapidly.

Those with the Ph.D. degree may have less difficulty finding jobs than persons with less education, but they may face competition for entry level jobs, especially in college and university teaching. Many graduates with the Ph.D. look for jobs with colleges and universities

where there will be increasing numbers of students taking mathematics courses. However, some may have to accept jobs that do not fully utilize their training, especially those who have specialized in pure or theoretical mathematics.

There is a need for more mathematicians to solve an increasingly wide variety of complex research and development problems. In engineering, for example, applications of mathematical techniques and principles will be needed in the design of equipment, from simple devices to airplanes, ships, and missiles, in order to get the most reliable performance for the least cost. In addition, mathematicians will be increasingly needed in research in the natural and social sciences, military sciences, operations research, and business management. This work requires both a high degree of mathematical competence and a knowledge of the field of specialization. Expenditures to support these research and development activities increased steadily through most of the 1960's, and then fell slightly in the early 1970's; they are expected to rise again through the mid-1980's, although more slowly than in the past.

College graduates with degrees in mathematics will be able to find jobs in many other fields, because the education necessary for a degree in mathematics is also an excellent background for other jobs that rely heavily on the application of mathematical theories and methods. Thus, many mathematics majors may find jobs in high school teaching, statistics, actuarial work, computer programming, systems analysis, economics, engineering, physical science, and life science. Employment opportunities in these related fields will probably be best for those who combine a major in

mathematics with a minor in one of these subjects.

Earnings and Working Conditions

In 1972, mathematicians earned average salaries over twice as high as the average for nonsupervisory workers in private industry, except farming. Starting salaries for mathematicians and mathematical statisticians averaged \$9,500 a year according to the limited data available. Those with a master's degree could start at about \$11,000 annually. Yearly salaries for new graduates having the Ph.D., most of whom had some experience, averaged over \$16,000.

In the Federal Government in early 1973, mathematicians having the bachelor's degree and no experience could start at either \$7,694 or \$9,520 a year, depending on their college records. Those with the master's degree could start at \$11,614 or \$13,996; and persons having the Ph.D. degree could begin at either \$13,996 or \$16,682.

Salaries paid to college and university teachers vary greatly depending both on the quality and location of the school and the ability and experience of the individual. According to the American Mathematical Society, college and university teachers earned from as low as \$8,000 a year (instructors) to \$25,000 a year (professors). Some were paid over \$30,000 annually.

Mathematicians in colleges and universities often supplement their regular salaries with income from summer teaching, special research projects, consulting, and writing.

Sources of Additional Information

There are several brochures that give facts about the field of mathematics, including career opportunities, professional training, and col-

leges and universities with degree programs.

Professional Training in Mathematics is available for 25¢ from:

American Mathematical Society, P.O.
Box 6248, Providence, R.I. 02904.

Professional Opportunities in Mathematics (35¢) and *Guide Book to Departments in the Mathematical Sciences* (\$1.35) are provided by:

Mathematical Association of America
1225 Connecticut Ave. NW., Wash-
ington, D.C. 20036.

For specific information on careers in applied mathematics and electronic computer work, contact:

Association for Computing Machinery
1133 Avenue of the Americas, New
York, N.Y. 10036.

Society for Industrial and Applied
Mathematics, 33 S. 17th St., Phila-
delphia, Pa. 19103.

Facts on careers in mathe-
matical statistics are available
from:

Institute of Mathematical Statistics
Department of Statistics, California
State College at Hayward, Hayward,
Cal. 94542.

For Federal Government career
information, contact any regional
office of the U.S. Civil Service
Commission, or:

Interagency Board of U.S. Civil
Service Examiners, 1900 E St. NW.,
Washington, D.C. 20415.

Other sections of the *Handbook*
discuss related occupations, such
as statisticians, actuaries, program-
mers, and systems analysts.

STATISTICIANS

(D.O.T. 020.188)

Nature of the Work

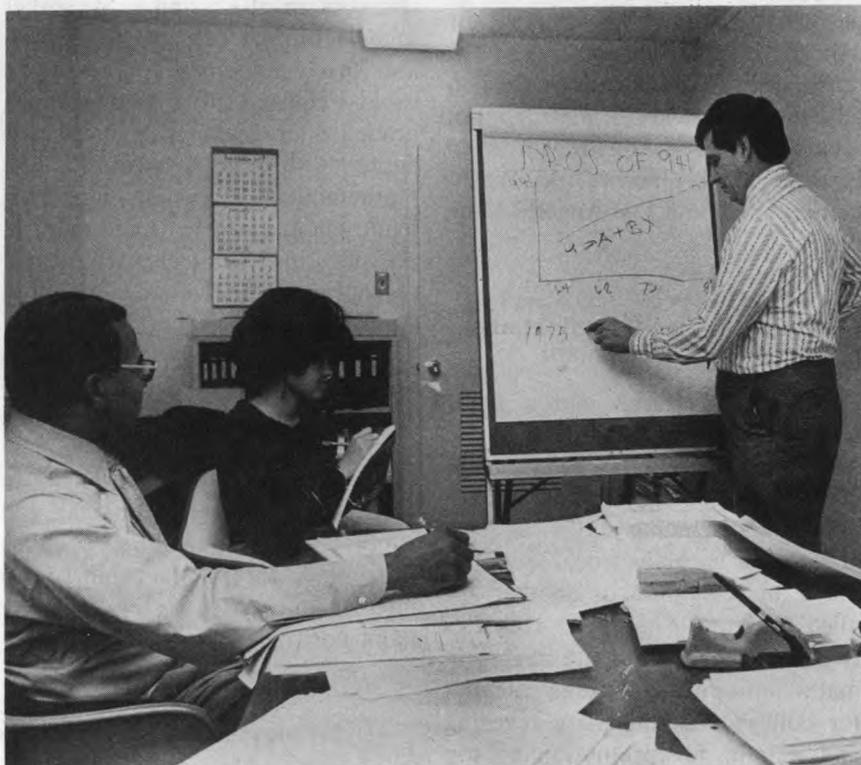
Statistics are numbers that help describe the characteristics of the world and its inhabitants. Statisticians collect, analyze, and interpret numerical data based on their knowledge of statistical methods and of a particular subject, such as economics, human behavior, or engineering. They may use statistical techniques to predict population growth or economic conditions, develop quality control tests for manufactured products, or help business managers and government officials make decisions and evaluate the results of new programs.

Many statisticians plan surveys, design experiments, or analyze data. For most surveys, the statis-

tician must select a sample; for example, television rating services ask only a few thousand families, rather than all viewers, what programs they watch. Statisticians decide where to get the data, determine the type and size of the sample group, and develop the survey questionnaire or reporting form. They also prepare the instructions for workers who will tabulate the returns. Statisticians who design experiments prepare mathematical models to test a particular theory. Those in analytical work interpret collected data and summarize their findings in tables, charts, and written reports.

Some statisticians direct statistical programs. A few combine research with teaching. The rest work in quality control, operations research, production and sales forecasting, and market research.

Because statistics has such a



Statisticians use statistical techniques to predict economic conditions.

wide use, it is sometimes difficult to distinguish statisticians from specialists in other fields who use statistics. For example, a statistician working with data on economic conditions may have the title of economist. Statisticians sometimes work closely with mathematicians and mathematical statisticians. (See statement on mathematicians elsewhere in this section.)

Places of Employment

Approximately 23,000 persons—over one-third of them women—worked as statisticians in 1972. About 2 out of 3 statisticians are in private industry, primarily in manufacturing, public utility, finance, and insurance companies. More than one-fifth worked for the Federal Government, primarily in the Departments of Commerce; Agriculture; Defense; and Health, Education, and Welfare. Others worked in State and local government or colleges and universities.

Although statisticians work in all States, most are in metropolitan areas, and about one-fourth lived in three areas—New York; Washington, D.C.; and Los Angeles-Long Beach.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in statistics or mathematics is the minimum educational requirement for many beginning jobs in statistics. For other beginning statistical jobs, however, a bachelor's degree with a major in economics or another applied field and a minor in statistics is preferable. A graduate degree in mathematics or statistics is essential for college and university teaching and helpful for promotion to top administrative and consulting jobs. Advancement in analytical and sur-

vey work usually requires graduate training.

Fewer than 80 colleges and universities offered a bachelor's degree in statistics in 1972. However, most schools offer either a degree in mathematics or a sufficient number of courses in statistics to qualify graduates for beginning positions. Required subjects include mathematics through differential and integral calculus, statistical methods, and probability theory. Courses in computer uses and techniques are useful for many jobs. For quality control positions, training in engineering or a physical or biological science and in the application of statistical methods to manufacturing processes is desirable. For many market research, business analysis, and forecasting jobs, courses in economics, business administration, or a related field are helpful.

About 100 colleges and universities offered graduate degrees in statistics in 1972, and many other schools offered one or two graduate level statistics courses. The usual requirement for entering a graduate program is a bachelor's degree with a good background in mathematics. Students should attend schools where they can do research in a subject-matter field, as well as take advanced courses in statistics.

Beginning statisticians who have only the bachelor's degree often spend much of their time performing routine statistical work. Through experience, they may advance to positions of greater technical and supervisory responsibility. Those who have exceptional ability and interest may rise to top management positions.

Employment Outlook

Employment opportunities for well-qualified persons who can com-

bine training in statistics with knowledge of a field of application are expected to be favorable through the mid-1980's. In addition to job openings resulting from the rapid growth expected in the profession, hundreds of statisticians will be needed each year to replace those who retire, die, or transfer to other occupations.

Private industry will require increasing numbers of statisticians for quality control in manufacturing. Statisticians with a knowledge of engineering and the physical sciences will find jobs working with scientists and engineers in research and development. Business firms will rely more heavily on statisticians to forecast sales, analyze business conditions, modernize accounting procedures, and help solve management problems.

Government agencies will need statisticians for existing and new programs in fields such as social security, health, education, and economics. Colleges and universities will employ others to teach a growing number of students, as the broader use of statistical methods makes such courses increasingly important to persons majoring in fields other than mathematics and statistics.

Earnings and Working Conditions

In 1972, statisticians earned average salaries almost three times as high as the average for nonsupervisory workers in private industry, except farming. New college graduates averaged about \$9,300 a year, according to the limited information available. Those with the master's degree could start at about \$11,000 a year.

In the Federal Government in early 1973, statisticians who had the bachelor's degree and no experience could start at either \$7,649

or \$9,520 a year, depending on their college grades. Beginning statisticians with the master's degree could start at \$11,614 or \$13,996. Those with the Ph.D. could begin at \$13,996 or \$16,682.

Statisticians employed by colleges and universities generally receive salaries comparable to those paid other faculty members. (See statement on College and University Teachers.) In addition to their regu-

lar salaries, statisticians in educational institutions sometimes earn extra income from outside research projects, consulting, and writing.

Sources of Additional Information

For information about career opportunities in statistics, contact:

American Statistical Association, 806
15th St., NW., Washington, D.C.
20005.

Facts on Federal Government jobs are available from:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C.,
1900 E St., NW., Washington, D.C.
20414.

For a list of reading materials on career opportunities in data processing, contact:

Association for Computing Machinery,
1133 Avenue of the Americas, New
York, N.Y. 10036.

PHYSICAL SCIENTISTS

Physical scientists deal with the basic laws of the physical world. Many, especially physicists and astronomers, do basic research to increase man's knowledge of the properties of matter and energy. Others, particularly chemists and food scientists, do basic and applied research, and develop new products and processes. For example, chemists in applied research use their knowledge of the interactions of various chemicals to improve the quality of products. Besides research and development, many chemists, food scientists, and some physicists work in production and sales-related activities in industry.

This section describes four physical science occupations—those of chemists, physicists, astronomers, and food scientists. Engineers, life scientists, and environmental scientists also require a background in the physical sciences; these occupations are described in separate sections elsewhere in the *Handbook*.

ASTRONOMERS

(D.O.T. 021.088)

Nature of the Work

How was our solar system created? Why do the stars shine? What do cosmic rays tell us about the origin of our universe? Astronomers—sometimes called *astrophysicists*—consider questions like these and, using the principles of physics and mathematics, study the structure and evolution of the universe. They collect and analyze data on the sun, moon, planets, and stars to deter-

mine the size, shape, temperature, chemical composition, and motion of these bodies. They also study the gases and dusts in space. One use of this data is to determine the age and size of the stars and how they were formed.

Astronomers compute the positions of the planets; calculate the orbits of comets, asteroids, and artificial satellites; and study the origin and nature of cosmic radiation. They also study the size and shape of the earth and the properties of its atmosphere.

To make observations of outer space, astronomers use complex photographic techniques, light-measuring instruments, and other optical devices. They use, for example, the spectroscope, a telescope with a prism attached, to separate light into its component colors and identify chemical elements in the universe. Yet astronomers actually spend a limited amount of time at the telescope. They also use other specialized devices for making observations of radio waves, X-rays, gamma rays, and cosmic rays. These instruments often are carried by balloons, rockets, and satellites. Electronic computers are useful for processing astronomical data to calculate orbits of asteroids or comets, guide spacecraft, and work out tables for navigational handbooks.

Astronomers usually specialize in one of the many branches of the science. Some areas of specialization are instruments and techniques, the sun, the solar system, and the evolution and interiors of stars.

Astronomers who work on observational programs begin their studies by deciding what stars or other objects to observe and what methods and instruments to use. They may need to design optical measuring devices to attach to the telescope to make the required measurements. These devices may be

made in the observatory shop. After these astronomers complete their observations, they analyze the results, present them in precise numerical form, and try to explain them on the basis of some theory.

Other astronomers concentrate on theoretical problems. They may formulate theories or mathematical models to explain observations made earlier by another astronomer. These astronomers develop mathematical equations from the laws of physics to compute, for example, theoretical models of how stars change as their nuclear energy sources become exhausted.

More than 85 percent of all astronomers teach or do research; some do both in colleges and universities. In some schools that do not have separate departments of astronomy or only small enrollments in the subject, astronomers may teach courses in mathematics or physics as well as astronomy. Other astronomers administer research programs, develop and design astronomical instruments, and do consulting work.

Places of Employment

Astronomy is one of the smallest of the physical sciences; about 2,000 persons worked as astronomers in 1972. Most astronomers work in colleges and universities. Some of these work in university-operated observatories, where they usually devote most of their time to research. Other astronomers work for observatories financed by non-profit organizations.

The Federal Government employed over 100 astronomers in 1972. Most worked for the Department of Defense, mainly at the U.S. Naval Observatory and the U.S. Naval Research Laboratory. Others worked for the National Aeronautics and Space Administration or the



National Science Foundation. A few astronomers worked for firms in the aerospace field, or in museums and planetariums.

Training, Other Qualifications, and Advancement

The usual requirement for a job in astronomy is a Ph.D. degree. Although persons with less education may qualify for some beginning jobs, high-level positions in teaching and research and advancement in most areas are open only to those with the doctorate.

In 1972, only 52 colleges and universities had programs leading to the bachelor's degree in astronomy. However, students with a bachelor's degree in physics or mathematics with a physics minor can usually qualify for graduate programs in astronomy. Students planning to become astronomers

usually study subjects that include physics, mathematics, and chemistry. Courses in statistics, computer science, and electronics also are useful. In schools with astronomy departments, students also take introductory courses in astronomy and astrophysics, and in astronomical techniques and instruments.

About 55 colleges and universities in various sections of the country offer the Ph.D. degree in astronomy. The graduate student takes advanced courses primarily in astronomy, physics, and mathematics. Some schools require that graduate students spend several months working at an observatory. In most institutions the work program leading to the doctorate is flexible and allows students to take courses in their own particular area of interest.

Young people planning on careers in astronomy should have inquisitive minds and imagination. Perseverance and the ability to concentrate

on detail and work independently also are important.

New graduates with a bachelor's or master's degree in astronomy usually begin as assistants in observatories, planetariums, large departments of astronomy in colleges and universities, Government agencies, or industry. Some work as research assistants while studying toward advanced degrees; others, particularly in the Federal Government, receive on-the-job training in the application of astronomical principles. New graduates with the doctorate can qualify for teaching and research jobs in colleges and universities and for research jobs in Government and industry.

Employment Outlook

Future opportunities for astronomers are heavily dependent on the amount of funds spent by the Federal Government for basic research in astronomy. These funds are expected to continue to increase through the mid-1980's, but at a slower rate than during the 1960's. Although relatively few college students are expected to receive the Ph.D. in astronomy in any one year, the number of job openings in any year may be even lower. Thus, competition may develop for beginning jobs. People without the Ph.D. are not usually considered professional astronomers, but may find jobs as research and technical assistants.

Requirements for astronomers are affected to some extent by the needs of the space program—rockets, missiles, manmade earth satellites, and space exploration. Astronomers analyze the data collected by rockets and spacecraft, and give direction to the astronomical observations that can only be carried out by means of equipment placed in space vehicles.

Earnings and Working Conditions

Astronomers have relatively high salaries, with average earnings almost three times as high as the average for non-supervisory workers in private industry, except farming.

In the Federal Government in early 1973, astronomers holding the Ph.D. degree could begin at \$13,996 or \$16,682, depending on their college record. Those having the bachelor's degree could start at \$7,619 or \$9,520; with the master's degree at \$11,614 or \$13,996.

In private industry, starting salaries averaged \$8,700 a year for those having the bachelor's degree, \$11,000 for those having the master's degree, and \$12,000 for those having the Ph.D. degree, according to the limited data available. Astronomers teaching in colleges and universities received salaries equivalent to those of other faculty members. (See statement on College and University Teachers elsewhere in the *Handbook*.)

Although most modern astronomers do not make direct observations but analyze data from satellites and radio telescopes, some still do nightwork. These people make visual photographic or photoelectric observations involving exposure to the outside air through the open dome of the observatory, sometimes on cold winter nights.

Sources of Additional Information

For information on careers in astronomy and on schools offering training in the field, contact:

American Astronomical Society, 211
FitzRandolph Rd., Princeton, N.J.
08540.

Facts on Federal Government careers are available from any regional office of the U.S. Civil Service Commission or from:

Interagency Board of Civil Service

Examiners for Washington, D.C.
1900 E St. NW., Washington, D.C.
20415.

CHEMISTS

(D.O.T. 022.081, .168, .181, and .281)

Nature of the Work

The clothes we wear, the foods we eat, the houses in which we live—in fact most things that help make our lives better, from medical care to a cleaner environment—result, in part, from the work done by chemists.

Chemists investigate the properties and composition of matter and the laws that govern the combination of elements. They search for and try to put into practical use new knowledge about substances. They apply scientific principles and techniques and use many specialized instruments to measure, identify, and evaluate changes in matter. Chemists maintain accurate records of their work and prepare reports showing results of tests or experiments.

Chemists may develop new substances, such as rocket fuel, or inspect and test final products to make sure they meet industry and government standards. The materials with which chemists work vary by industry. For example, in the health field, chemists may develop vaccines, but in the food industry, they may develop food additives. (See statements on Biochemists and Food Scientists elsewhere in the *Handbook*.)

Nearly two-fifths of all chemists work in research and development. In basic research, chemists try to extend scientific knowledge rather than solve practical problems. Basic

research results, however, have practical uses. For example, research on how and why small molecules unite to form larger ones (polymerization) has been used to make synthetic rubber and plastics. Chemists in research and development often create new products. Top management, for example, may give the chemists a description of a needed item. If similar products exist, chemists test samples to determine their ingredients. If similar products are not available, chemists experiment with various substances to obtain a product with the required specifications.

Over one-fourth of all chemists administer and manage programs, especially those related to research and development. Nearly one-fifth of all chemists work in production and inspection activities. In production operations, chemists prepare instructions (batch sheets) for plant workers and specify the kind and amount of ingredients to use and the exact mixing time for each stage in the process. At each step, chemists test samples for quality control to insure that they meet industry and government standards. Chemists in these areas also are concerned with improving products and processes. Others work as marketing or sales representatives when the job requires a technical knowledge of the various products. More than one-tenth of all chemists teach in colleges and universities where they may do some research. Some chemists are consultants to private industry firms and government agencies.

Places of Employment

Nearly 134,000 persons worked as chemists in 1972; about 10 percent were women. More than two-thirds of all chemists work in private industry; half are in the chemicals

manufacturing industry. Most of the remainder work for companies manufacturing food, scientific instruments, petroleum, paper, and electrical equipment.

Colleges and universities employed more than 25,000 chemists. A smaller number worked for non-profit research organizations. A number of chemists are employed by Federal Government agencies, chiefly the Departments of Defense; Health, Education, and Welfare; Agriculture; and Interior. Small numbers work for State and local governments, primarily in agencies concerned with health or agriculture.

Chemists are employed in all States, but usually are concentrated in large industrial areas. Nearly one-fifth of all chemists were located in four metropolitan areas—New York, Chicago, Philadelphia, and Newark. About half of the total worked in six States—New York, New Jersey, California, Pennsylvania, Ohio, and Illinois.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in chemistry is usually the minimum requirement for starting a career as a chemist. Graduate training is essential for many positions, particularly in research and college teaching.

Over 1,000 colleges and universities offer a bachelor's degree in chemistry. In addition to the required chemistry courses (analytical, inorganic, organic, and physical chemistry), undergraduates take courses in mathematics (especially geometry and calculus) and physics.

Over 300 colleges and universities award advanced degrees in chemistry. In graduate school, students usually specialize in a particular field of chemistry. Requirements for the master's or doctor's degree

vary, but usually include a thesis based on independent research.

Students planning careers as chemists should enjoy studying science and mathematics, and ought to like working with their hands to build scientific apparatus and to perform experiments. Perseverance and the ability to concentrate on detail and work independently are essential. Other desirable assets include an inquisitive mind, a good memory, and imagination. Chemists also should have good eyesight and good eye-hand coordination.

New graduates with the bachelor's degree generally begin their careers in government or industry by analyzing or testing products, working in technical sales or service, or assisting senior chemists in research and development laboratories. Many employers have special training and orientation programs for new graduates. These programs are concerned with special techniques and help new graduates determine the types of work best suited to their interest and talents. Candidates for an advanced degree often teach or do research in colleges and universities while working toward advanced degrees. They also may qualify as secondary school teachers.

Beginning chemists with the master's degree can usually go into applied research positions in government or private industry. They also may qualify for some teaching positions in colleges and universities and many positions in 2-year colleges.

The Ph.D. generally is required for basic research, for teaching in colleges and universities, and for advancement to most administrative positions.

Employment Outlook

Employment opportunities for new chemistry graduates are ex-

pected to be favorable through the mid-1980's. In addition to opportunities resulting from the very rapid growth expected for this profession, thousands of new chemists will be needed each year to replace those who retire, die, or transfer to other occupations.

The favorable outlook for chemists assumes that additional chemists will be needed for research and development work. Research and development expenditures of government and industry are expected to increase through the mid-1980's, although at a slower rate than during the 1960's. The expected slowdown in Federal R&D spending basically reflects anticipated shifts in the relative importance of space and defense. However, if actual R&D expenditures levels and patterns differ significantly from those assumed, the outlook for chemists would be altered.

Growth in demand for industrial products, including plastics, man-made fibers, drugs, and fertilizers will increase employment opportunities for chemists. For example, chemists will be needed both by industrial companies and government agencies to help solve pollution control problems, establish better health care programs, and do health-related research in hospitals. New and better solid and liquid fuels to stem fuel shortages could require more chemists. Some also will be needed to work in Federal, State, and local crime laboratories.

Larger enrollments through the mid-1980's will require more chemists, especially Ph.D.'s, to teach in colleges and universities. Additional opportunities will become available in 2-year colleges. (See statements on colleges and universities elsewhere in the *Handbook*.)

New graduates also will find openings in high school teaching after completing professional education courses and other requirements



Chemist records results of experiments.

for a State teaching certificate. However, they usually are regarded as teachers rather than as chemists. (See statement on Secondary School Teachers elsewhere in the *Handbook*.)

Earnings and Working Conditions

Chemists have relatively high salaries, with average earnings about twice those received by nonsupervisory workers in private industry, except farming. According to the American Chemical Society, annual salaries for experienced chemists having a bachelor's degree averaged \$15,600 in 1972; for those with a master's degree, \$16,300; and for those with a Ph.D., \$19,200.

Private industry paid inexperienced chemists with the bachelor's degree starting salaries of \$9,000 a year; those with the master's degree \$10,300; and those with the Ph.D. \$15,600. In colleges and universities, those with the master's degree earned \$8,100 and those with the Ph.D. averaged \$10,920 to start.

Many experienced chemists in educational institutions supplement their regular salaries with income from consulting, lecturing, and writing.

Depending on college records, the annual starting salary in the Federal Government in early 1973 for an inexperienced chemist with a bachelor's degree was either \$7,694 or \$9,520. Beginning chemists who had 1 year of graduate study could start at \$9,520 and those who had 2 years of graduate study, at \$11,614. Chemists having the Ph.D. degree could start at \$13,996 or \$16,682.

Chemists work mostly in modern, well-equipped, well-lighted laboratories, offices, or classrooms. Hazards involve handling potentially explosive or highly caustic chemicals. However, when safety regulations are followed health hazards are negligible.

Sources of Additional Information

General information on career opportunities and earnings for chemists may be obtained from:

- American Chemical Society, 1155 16th St., NW., Washington, D.C. 20036.
- Manufacturing Chemists' Association, Inc., 1825 Connecticut Ave., NW., Washington, D.C. 20009.

Specific information on Federal Government careers may be obtained from:

- Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St., NW., Washington, D.C. 20415.

For additional sources of information, see statements on Biochemists, Chemical Engineers, and Industrial Chemical Industry. Information on chemical technicians may be found in the statement on Technician Occupations.

FOOD SCIENTISTS

(D.O.T. 022.891,040.081,041.081)

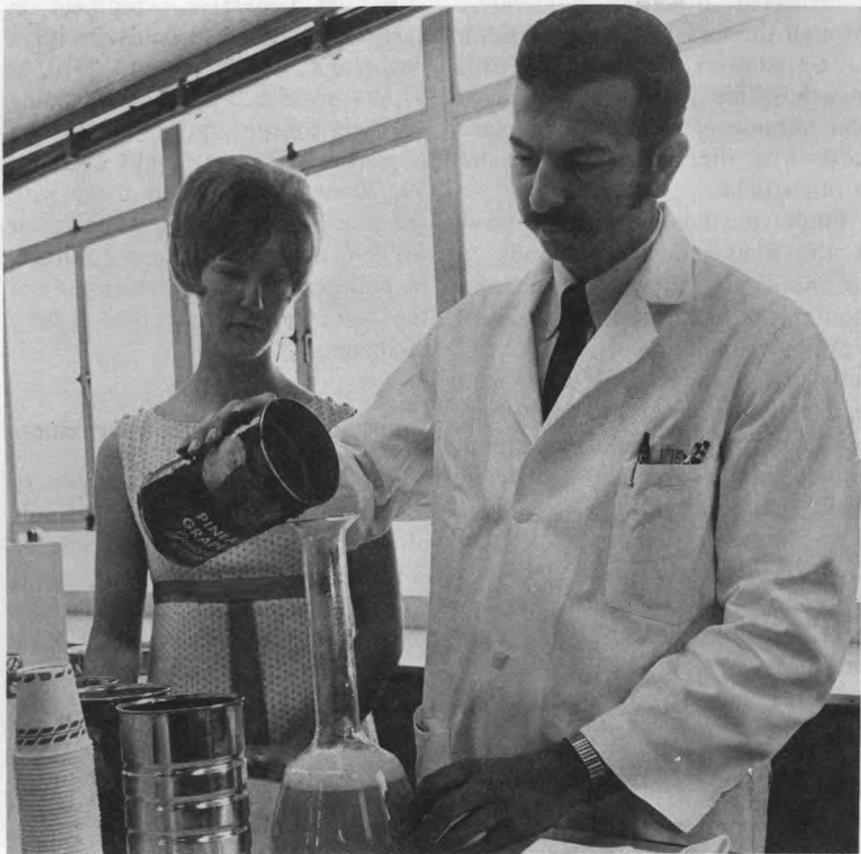
Nature of the Work

Someone has estimated that the average family of four consumes over 5,000 pounds of food a year. In the past, housewives processed most food in the home, but today, industry processes almost all foods. People in many occupations are involved with food processing. A key worker is the *food scientist* or *food technologist*.

Food scientists investigate the chemical, physical, and biological nature of food and apply this knowledge to processing, preserving, packaging, distributing, and storing an adequate, nutritious, wholesome, and economical food supply. About three-fifths of all scientists in food processing work in research and development. Others work in quality assurance laboratories or in production or processing areas of food plants. Some teach or do basic research in colleges and universities.

Food scientists in basic research study the structure and composition of food and the changes it undergoes in storage and processing. For example, they may develop new sources of proteins, study the effects of processing on microorganisms, or search for factors that affect the flavor, texture, or appearance of foods. Food scientists who work in applied research and development create new foods and develop new processing methods. They also seek to improve existing foods by making them more nutritious and enhancing their flavor, color, and texture.

Food scientists insure that each new product will retain its characteristics and nutritive value during storage. They also may conduct chemical and microbiological tests to see that products meet industry



Food scientists test food for color and flavor.

and government standards. Others test additives for purity, investigate changes that take place during processing, or develop mass-feeding methods for food service institutions.

In quality control laboratories, food scientists check raw ingredients for freshness, maturity, or suitability for processing. They may use machines that test for tenderness by finding the amount of force necessary to puncture the item. Periodically, they inspect processing line operations to insure conformance with government and industry standards. For example, scientists test canned goods for sugar, starch, protein, fat, vitamin, and mineral content. In frozen food plants, they make sure that, after processing, various enzymes are inactive so that

the food won't spoil during storage. Others are concerned with packaging materials that maintain shelf life and product stability. They often supervise technicians who assist in product testing. (See statement on Food Processing Technicians elsewhere in the *Handbook*.)

Food scientists in production schedule processing operations, prepare production specifications, maintain proper temperature and humidity in storage areas, and supervise sanitation operations, including the efficient and economical disposal of wastes. To increase efficiency, they advise management on the purchase of equipment and recommend new sources of materials.

Food scientists maintain records

and reports that show results of tests or experiments.

In addition, some food scientists work in market research, advertising, and technical sales. Others teach in colleges and universities.

Places of Employment

About 7,500 persons, almost 15 percent women, worked as food scientists in 1972. Food scientists work in all sectors of the food industry and in every state. The types of product on which they work may depend on where in the country they work: for example, in Maine and Ohio they work with potatoes; in New York and Pennsylvania, with flavor ingredients; in the Mid-west, with cereal products or meat packing; and in Florida and California, with orange juice. The greatest number work in California, Illinois, New York, Pennsylvania, Texas, Ohio, New Jersey, Wisconsin, Michigan, and Iowa.

Some food scientists do research for Federal agencies such as the Food and Drug Administration and the Departments of Agriculture and Defense; others work in State regulatory agencies. A few work for private consulting firms and international organizations such as the United Nations. Some teach or do research in colleges and universities. (See statement on College and University Teachers elsewhere in the *Handbook*.)

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in food science, or in one of the physical or life sciences such as chemistry and biology, is the usual minimum requirement for beginning jobs in food science. An advanced degree is necessary for many jobs, particularly research and college teaching, and for some management

level jobs in industry.

Nearly 60 colleges and universities offered programs leading to the bachelor's degree in food science in 1972; the Institute of Food Technologists approved 30 of these. Undergraduate students usually take courses in physics, chemistry, mathematics, biology, the social sciences and humanities, and business administration, as well as specialized food science courses.

Most of the colleges and universities that provide undergraduate food programs also offer advanced degrees. Graduate students usually specialize in a particular area of food science. Requirements for the master's or doctor's degree vary by institution, but usually include laboratory work and a thesis.

Young people planning careers as food scientists should have analytical minds and like details and technical work. Food scientists must express their ideas to others and understand other people's ideas. Flexibility, imagination, and creativity are important in meeting food needs for an expanding population.

A food scientist with a bachelor's degree might start work as a quality assurance chemist or as an assistant production manager. After gaining experience the food scientist can advance to more responsible management jobs. The scientist also might begin as a junior food chemist in a research and development laboratory of a food company, and be promoted to section head or another research management position.

People who have master's degrees may begin as senior food chemists in a research and development. Those who have the Ph.D. probably would begin their careers doing basic research or teaching.

Employment Outlook

Employment of food scientists

is expected to grow moderately through the mid-1980's. In addition to openings resulting from this growth, some jobs will open each year because of the need to replace those who die, retire, or transfer to other fields.

Employment is expected to grow as the food industry responds to the need for a wholesome and economical food supply for an increasing population. In addition, both private households and food service institutions that supply outlets such as airlines and restaurants will demand a greater quantity of quality convenience foods.

An increasing number of food scientists are expected to find jobs in research and product development. In recent years, expenditures for research and development in the food industry have increased moderately and probably will continue to rise. Research could produce new foods from modifications of wheat, corn, rice, and soybeans. For example, food scientists may create "meat" products from these vegetable proteins that resemble beef, pork, and chicken. There will be an increased need for food scientists in quality control and production because of the complexity of products and processes and the application of higher processing standards and new government regulations.

Earnings and Working Conditions

Food scientists had relatively high earnings in 1972, over twice as much as the average for nonsupervisory workers in private industry, except farming. Those with a bachelor's degree and no experience had starting salaries of about \$9,000 a year, according to the limited data available. Those with a master's degree started at about \$10,200, and those with the Ph.D. at about \$14,250.

In the Federal Government in early 1973, Food Scientists with a bachelor's degree could start at \$7,694 or \$9,520 a year, depending on their college grades. Those with a master's degree could start at \$9,520 or \$11,614, and those with the Ph.D. degree could begin at \$13,996 or \$16,682. Food scientists in colleges and universities earned the same salaries as other faculty members.

Sources of Additional Information

For information on careers in food science and a list of schools offering programs in food science contact:

The Institute of Food Technologists,
Suite 2120, 221 North LaSalle St.,
Chicago, Ill. 60601.

PHYSICISTS

(D.O.T. 023.081 and .088)

Nature of the Work

The flight of astronauts through space, the probing of ocean depths, or even the safety of the family car depend on research by physicists. Through systematic observation and experimentation, physicists describe in mathematical terms the structure and interactions between matter and energy. Physicists develop theories and discover the fundamental laws that describe forces within the universe. Determining basic laws governing phenomena such as gravity, electromagnetism, and heat flow leads to discoveries and innovations. For instance, the development of irradiation therapy equipment which destroys harmful growths in humans without damaging other tissues resulted from what physicists know about radioactivity.

Physicists have contributed to scientific progress in recent years in areas such as nuclear energy, electronics, communications, and aerospace.

Over half of all physicists work in research and development. Some do basic research to increase scientific knowledge. For example, they determine the relationships between the fundamentals of nuclear structure and the fundamental forces between nucleons (nuclear dynamics). The equipment that physicists develop for their basic research can often be applied to other areas. For example, lasers (a device which amplifies light and emits electromagnetic waves in a narrow, intense light beam) are utilized in surgery;

microwave devices are used for ovens; and measurement techniques and instruments developed by physicists can detect and measure the kind and number of cells in blood.

Some engineering oriented physicists do applied research and help develop new products. For instance, their knowledge of solid-state physics led to the development of transistors and micro-circuits used in electronic equipment that ranges from hearing aids to missile guidance systems.

About one-fifth of all physicists teach in colleges and universities. Almost another fifth work in management and administration, especially research and development programs. A small number work in

inspection, quality control, and other production related jobs in industry. Some do consulting work.

Most physicists specialize in one or more branches of the science—elementary-particle physics; nuclear physics; atomic, electron, and molecular physics; physics of condensed matter; optics, acoustics, and plasma physics; and the physics of fluids. Some specialize in a subdivision of one of these branches. For example, within solid-state physics concentration may include ceramics, crystallography, or semiconductors. However, since all physics specialties rest on the same fundamental principles, a physicist's work often overlaps many specialties.

Growing numbers of physicists are specializing in fields combining physics and a related science—such as astrophysics, biophysics, chemical physics, and geophysics. Furthermore, the practical applications of physicists' work have increasingly merged with engineering.

Places of Employment

About 49,000 people worked as physicists in 1972; nearly 4 percent were women. Private industry employed over 19,000; almost two-fifths of these were in companies manufacturing chemicals, electrical equipment, and ordnance products. Commercial laboratories and independent research organizations employ more than one-fourth of the physicists in private industry.

More than 22,000 physicists either taught or did research in colleges and universities; some did both. Over 6,000 physicists were in the Federal Government in 1972, mostly the Department of Defense. The Department of Commerce also employs large numbers of physicists. About 1,300 physicists worked in nonprofit organizations.

Although physicists are employed



Physicists work with complex equipment such as atomic accelerators.

in all States, their employment is greatest in areas that have heavy industrial concentrations and large college and university enrollments. Nearly one-fourth of all physicists work in four metropolitan areas—Washington, D.C.; Boston; New York; and Los Angeles-Long Beach, and more than one-third are concentrated in three states—California, New York, and Massachusetts.

Training, Other Qualifications, and Advancement

A bachelor's degree in physics is the minimum requirement for young people beginning work as physicists. However, graduate training is increasingly the hallmark of full professional status and is essential for many entry jobs and for advancement in all types of work. The doctorate is usually required for full faculty status at colleges and universities and for jobs administering research and development programs.

Physicists who have master's degrees qualify for many research jobs. Some instruct and conduct laboratory sessions in colleges and universities while working for their Ph.D.

Physicists who have bachelor's degrees qualify for many applied research and development jobs in private industry or the Federal Government. Some become research assistants in colleges and universities while working toward advanced degrees. Many with a bachelor's degree in physics enter nontechnical work, other science fields, or become engineers.

Almost 900 colleges and universities offer a bachelor's degree in physics. In addition, many engineering schools offer a physics major as part of the general curriculum. The undergraduate program in physics provides a broad background in the science and serves as a base for later specialization either in

graduate school or on the job. Some typical physics courses are mechanics, electricity, and magnetism, optics, thermodynamics, and atomic and molecular physics. Students also take courses in chemistry and mathematics.

More than 300 colleges and universities offer advanced degrees in physics. In graduate school, the student, with faculty guidance, usually works in a specific field. The graduate student, especially the candidate for the Ph.D. degree, spends a large portion of his time in research.

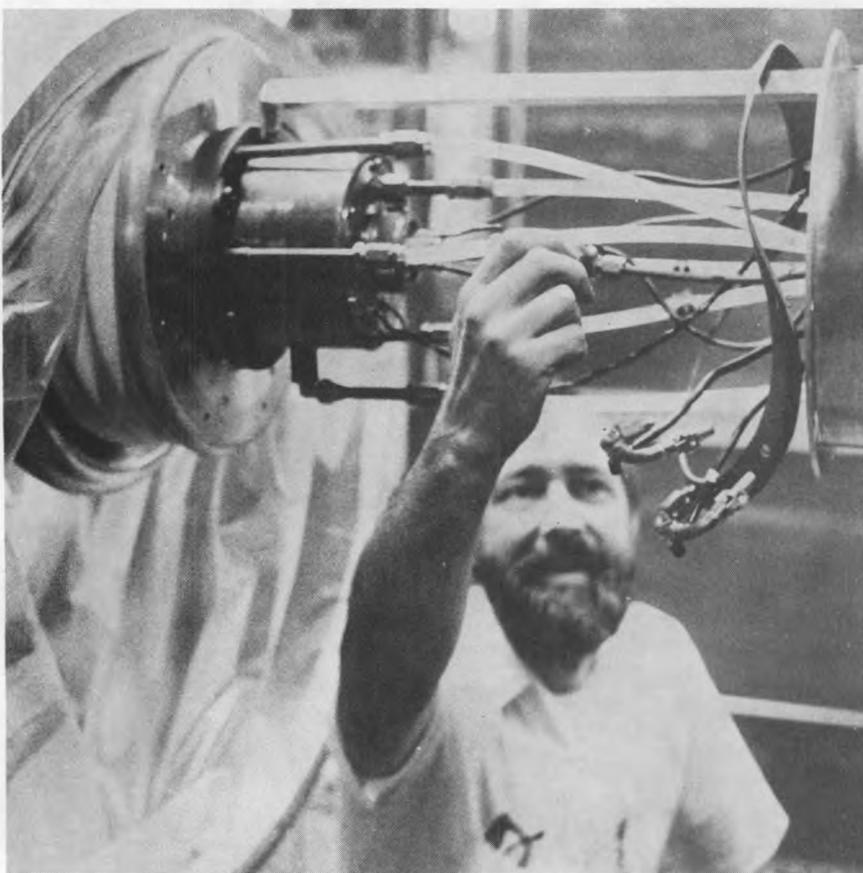
Students planning a career in physics should have an inquisitive mind, good memory, and imagination. They must distrust conventional assumptions about the universe

and be eager to try a new approach to discovering truths. Physicists doing basic research generally receive less supervision than those in mission-oriented applied research and development.

Employment Outlook

Physicists with advanced degrees should have favorable employment opportunities through the mid-1980's, primarily in applied research and development. In addition to opportunities resulting from the moderate growth expected in this field, physicists will be needed each year to replace those who transfer to other fields of work, retire, or die.

Some of the past increases in em-



Physicists develop equipment used in cancer research.

ployment of physicists resulted from increases in Federal research and development (R&D) expenditures, especially for space and defense related programs. Physicists will continue to be required to do complex R&D in both defense and non-defense related areas. Through the mid-1980's, R&D expenditures of Government are expected to increase, although at a slower rate than during the 1960's. The anticipated slowdown in the rate of growth basically reflects the declining priority given to space and defense R&D programs. However, if actual R&D expenditure levels and patterns were to differ significantly from those assumed, the outlook for physicists would be altered.

Some physicists with advanced degrees will be needed to teach in colleges and universities, primarily because of the growing need for physics training in all science and engineering programs.

New graduates also will find opportunities in other occupations that utilize their training. For example, they may become high school teachers after completing the required educational courses and obtaining a State teaching certificate. However, they are usually regarded

as teachers rather than as physicists. (See statement on Secondary School Teachers elsewhere in the *Handbook*.)

Earnings and Working Conditions

Physicists have relatively high salaries, with average earnings more than twice those received by non-supervisory workers in private industry, except farming. Starting salaries for physicists who have the bachelor's degree averaged about \$9,900 a year in manufacturing industries in 1972, those having master's degrees \$11,800, and those having the Ph.D. \$16,000.

Depending on their college records, physicists who have a bachelor's degree and no experience could start work in the Federal Government in early 1973 at either \$7,694 or \$9,520. Beginning physicists completing all requirements for the master's degree could start at \$9,520 or \$11,614. Physicists having the Ph.D. degree could begin at \$13,996 or \$16,682.

Starting salaries on college and university faculties for physicists with a master's degree averaged \$10,200 in 1972, and salaries for those having the Ph.D. averaged

\$11,800. (See statement on College and University Teachers elsewhere in the *Handbook*.) Many faculty physicists supplement their regular incomes by working as consultants and taking on special research projects.

Young physicists may begin their careers doing routine laboratory tasks. After some experience, they are assigned more complex tasks and may advance to project leaders or research directors. Some work in top management jobs. Physicists who develop new products sometimes form their own companies or join new firms to exploit their ideas.

Sources of Additional Information

General information on career opportunities in physics is available from:

American Institute of Physics, 335
East 45th St., New York, N.Y. 10017.

For information on Federal Government careers contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C.,
1900 E St., NW., Washington, D.C.
20415.

TECHNICIAN OCCUPATIONS

Before World War II scientists and engineers worked directly with craftsmen and other skilled workers. For example, an engineer might design and develop a product or process, while skilled workers would carry out the more routine parts of the plan. Because of rapid technological advances, however, it became more difficult for skilled workers, who usually had a limited knowledge of science and mathematics, to work directly with scientists and engineers. A need developed for workers, called technicians, specifically trained to assist engineers and scientists, or in some cases to do work that otherwise would have to be done by engineers or scientists.

Although technician occupations have grown rapidly, the term "technician" has no generally accepted definition. Employers use it to refer to workers in a variety of jobs requiring a wide range of education and training. The term is used to describe employees doing relatively routine work, persons performing work requiring technical but limited skills, and those doing highly technical work, including persons working closely with engineers and scientists.

In this chapter, "technicians" refers to workers who use engineering, scientific, and mathematical theory; who have specialized education and/or training in some aspect of technology or science; and who generally work directly with engineers and scientists. This chapter contains statements on engineering and science technicians, food processing technicians, draftsmen, surveyors, and broadcast technicians. Information on technical occupations in the health field—including

dental laboratory technicians, radiological technologists, and dental hygienists—is presented elsewhere in the *Handbook*..)

BROADCAST TECHNICIANS

(D.O.T. 194.281, .282, and .782; 957.282; and 963.168 through .887)

Nature of the Work

Broadcast technicians operate and maintain the electronic equipment used to record or transmit radio and television programs. They work with microphones, sound recorders, light and sound effects, television cameras, video tape recorders, and other equipment.

In the control room, broadcast technicians operate equipment that regulates the quality of sounds and pictures being recorded or broadcast. They also operate controls that switch broadcasts from one camera or studio to another, from film to live programming, or from network to local programs. By means of hand signals and, in television, by use of telephone headsets, they give technical directions to personnel in the studio.

When events outside the studios are to be broadcast, technicians may go to the site and set up, test, and operate the necessary equipment. After the broadcast, they dismantle the equipment and return to the station.

As a rule, broadcast technicians in small stations perform a variety of duties. In large stations and in networks, on the other hand, technicians are more specialized, although specific job assignments may change from day to day. *Transmitter technicians* monitor and log outgoing signals and are responsible

for transmitter operation. *Maintenance technicians* set up, maintain, and repair electronic broadcasting equipment. *Audio control technicians* regulate sound pickup, transmission, and switching. *Video control technicians* regulate the quality, brightness, and contrast of television pictures. *Lighting technicians* direct lighting of television programs. *Field technicians* set up and operate broadcasting equipment for programs originating outside the studio. *Recording technicians* operate and maintain sound recording equipment. *Video recording technicians* operate and maintain video tape recording equipment. Sometimes the term "engineer" is substituted for "technician" in the above titles.

Places of Employment

About 22,000 broadcast technicians were employed in radio and television stations in 1972. Most radio stations employ fewer than four technicians, although a few large ones have more than 10. Nearly all television stations employ at least five broadcast technicians, and those in large metropolitan areas average about 30. In addition to the technicians, several thousand supervisory personnel, with job titles such as chief engineer and director of engineering, work in technical departments.

Broadcast technicians are employed in every State, particularly in the larger cities. The highest paying and most specialized jobs are concentrated in New York, Los Angeles, and Washington, D.C.—the originating centers for most of the network programs.

Training, Other Qualifications, and Advancement

A young person interested in becoming a broadcast technician should plan to get a Radiotelephone



Broadcast technician plays back tape.

First Class Operator License from the Federal Communications Commission (FCC). Federal law requires that anyone who operates or adjusts broadcast transmitters in television and radio stations must hold such a license. Some stations require all their broadcast technicians including those who do not operate transmitters to have this license. Applicants for the license must pass a series of written examinations. These cover construction and operation of transmission and receiving equipment; characteristics of electromagnetic waves; and regulations and practices, both Federal government and international, governing broadcasting. Information about these examinations and guides to study for them may be obtained from the Federal Communications Commission, Washington, D.C. 20036.

Among high school courses, algebra, trigonometry, and physics and other sciences provide valuable

background for young persons anticipating careers in this occupation. In terms of practice, building and operating an amateur radio station also is good training. Taking an electronics course in a technical school is still another good way to acquire the knowledge for becoming a broadcast technician. Some young persons gain work experience as temporary employees filling in for regular broadcast technicians while they are on vacation.

Many schools give courses especially designed to prepare the student for the FCC's first-class license test. Having training at the level of technical school or college is an advantage for those who hope to advance to supervisory positions or to the more specialized jobs in large stations and in the networks.

Young persons with FCC first-class licenses who get entry jobs are instructed and advised by the chief engineer or by other experi-

enced technicians concerning the work procedures of the station. In small stations, they may start by operating the transmitter and handling other technical duties, after a brief instruction period. As they acquire more experience and skill they are assigned to more responsible jobs. Those who demonstrate above-average ability may move into top-level technical positions, such as supervisory technician and chief engineer. A college degree in engineering is becoming increasingly important for advancement to supervisory and executive positions.

Employment Outlook

The number of broadcast technicians is expected to increase slowly through the mid-1980's. Most job openings will result from the need to replace experienced technicians who retire, die, or transfer to other occupations.

Some new job opportunities for technicians will be provided as new radio and television stations open. However, labor-saving technical advances, such as automatic programming, automatic operation logging, and remote control of transmitters will limit the demand for technicians.

Earnings and Working Conditions

Salaries of beginning technicians in commercial radio and television ranged from about \$100 to \$170 a week in 1972 and those of experienced technicians from about \$130 to \$320, according to the limited information available. As a rule, technicians' wages are highest in large cities and in large stations. Technicians employed by television stations usually are paid more than those who work for radio stations because television work is generally more complex. Technicians employed by educational broadcasting

stations generally earn less than those who work for commercial stations.

Most technicians in large stations work a 40-hour week with overtime pay for work beyond 40 hours. Many broadcast technicians in the larger cities work a 37-hour week. In small stations, many technicians work 2 to 8 hours of overtime each week. Evening, night, and weekend work frequently is necessary since many stations are on the air as many as 24 hours a day, 7 days a week. Network technicians may occasionally have to work continuously for many hours and under great pressure in order to meet broadcast deadlines. Most technicians receive paid vacations. Typically, vacations range from 1 to 4 weeks, depending on length of service.

Technicians generally work indoors in pleasant surroundings. The work is interesting, and the duties are varied. When remote pickups are made, however, technicians may work out of doors at some distance from the studios, under less favorable conditions.

Sources of Additional Information

General information careers for broadcast technicians may be obtained from:

National Association of Broadcasters,
1771 N St., NW., Washington, D.C.
20036.

Corporation for Public Broadcasting,
888 16th St., NW., Washington, D.C.
20006.

DRAFTSMEN

(D.O.T. 001.281, 002.281, 003.281,
005.281, 007.281, 010.281,
014.281, and 017.)

Nature of the Work

When making a space capsule, television set, building, or bridge, workers follow drawings that show the exact dimensions and specifications of the entire object and each of its parts. Workers who draw these plans are draftsmen.

Draftsmen prepare detailed drawings based on rough sketches, specifications, and calculations of engineers, architects, and designers. They also calculate the strength, quality, quantity, and cost of materials. Final drawings contain a

detailed view of the object as well as specifications for materials to be used, procedures followed, and other information to carry out the job.

In preparing drawings, draftsmen use compasses, dividers, protractors, triangles, and machines that combine the functions of several devices. They also use engineering handbooks, tables, and slide rules to help solve technical problems.

Draftsmen are classified according to the work they do or their level of responsibility. *Senior draftsmen* translate an engineer's or architect's preliminary plans into design "layouts" (scale drawings of the object to be built). *Detailers* draw each part shown on the layout, and give dimensions, materials, and other information to make the de-



Draftsmen prepare design layouts.

tailed drawing clear and complete. *Checkers* carefully examine drawings for errors in computing or recording dimensions and specifications. Under the supervision of draftsmen, *tracers* make minor corrections and trace drawings for reproduction on transparent cloth, paper, or plastic film.

Draftsmen may specialize in a particular field of work, such as mechanical, electrical, electronic, aeronautical, structural, or architectural drafting.

Places of Employment

About 327,000 people worked as draftsmen in 1972; almost 8 percent were women. About 9 out of 10 draftsmen work in private industry. Many work in industries making machinery, electrical equipment, and fabricated metal products. In the non-manufacturing sector, most draftsmen work for engineering and architectural consulting firms, construction companies, and public utilities.

Almost 20,000 draftsmen worked for Federal, State, and local governments in 1972. Those in the Federal Government worked mostly for the Defense Department. Draftsmen in State and local governments were mainly in highway and public works departments. Another several thousand draftsmen worked for colleges and universities and non-profit organizations.

Training, Other Qualifications, and Advancement

Persons interested in becoming draftsmen can acquire the necessary training in technical institutes, junior and community colleges, extension divisions of universities, and vocational and technical high schools. Others may qualify through on-the-job training programs combined with part-time schooling or 3-

4-year apprenticeship programs.

Training for a career in drafting, whether in a high school or post-high school program, should include courses in mathematics, physical sciences, mechanical drawing, and drafting. Shop practices and shop skills also are helpful since many higher level drafting jobs require knowledge of manufacturing or construction methods. Many technical schools offer courses in structural design, strength of materials, and metal technology.

Those planning careers in drafting should: be able to do detailed work requiring a high degree of accuracy; have good eyesight and eye-hand coordination because most of their work is done at the drawing board; be able to function as part of a team since they work directly with engineers, architects, and skilled workers; and be able to do free-hand drawings of three dimensional objects. Although the occupation generally does not require such artistic ability, it may be helpful in some specialized fields.

High school graduates usually start out as tracers. Those having post-high school technical training often can qualify as junior draftsmen. After gaining experience, they may advance to checkers, detailers, senior draftsmen, or supervisors. Some may become independent designers. Courses in engineering and mathematics sometimes enable draftsmen to transfer to engineering positions.

Employment Outlook

Job opportunities are expected to be favorable through the mid-1980's because of the very rapid growth expected in the occupation and the need to replace those who retire, die, or move into other fields of work. Prospects will be best for those having post-high school drafting training. Well-qualified high

school graduates who have studied drafting, however, will find opportunities in some types of jobs.

Employment of draftsmen is expected to rise rapidly as a result of the increasingly complex design problems of modern products and processes. In addition, as engineering and scientific occupations continue to grow, more draftsmen will be needed as supporting personnel. On the other hand, photoreproduction of drawings and expanding use of electronic drafting equipment and computers are eliminating many routine tasks. This development probably will reduce the need for less skilled draftsmen.

Earnings

In private industry, beginning draftsmen earned about \$525 a month in 1972 according to a Bureau of Labor Statistics survey. As they gain experience, draftsmen may move to higher level positions with a substantial increase in earnings. For example, in 1972 senior draftsmen averaged \$960 a month, about one and one-half times as much as the average earnings of nonsupervisory workers in private industry, except farming. Most draftsmen earned about \$800 per month.

In early 1973, the Federal Government paid high school graduates in trainee jobs about \$450 a month. For those having post-high school education or some experience in drafting, starting salaries were higher. The majority of experienced draftsmen working for the Federal Government earned between \$640 and \$800 a month.

Sources of Additional Information

General information on careers for draftsmen may be obtained from:

American Institute for Design and Drafting, 3119 Price Rd., Bartlesville, Okla. 74003.

American Federation of Technical Engineers, 1126 16th St., NW., Washington, D.C. 20036.

See Sources of Additional Information in the statement on Engineering and Science Technicians elsewhere in the *Handbook*.

ENGINEERING AND SCIENCE TECHNICIANS

(D.O.T. 002. through 029.)

Nature of the Work

Technicians' knowledge of science, mathematics, industrial machinery, and processes enables them to work in all phases of production, from research and design to manufacturing, sales, and customer service. Although their jobs are more limited and practically oriented than those of engineers or scientists, technicians often do highly technical work that engineers or scientists might otherwise have to do. Technicians frequently use complex electronic and mechanical instruments, experimental laboratory equipment, and drafting instruments. Almost all technicians described in this statement must be able to use engineering handbooks and computing devices such as slide rules and calculating machines.

In research and development (R&D), one of the largest areas of employment, technicians set up, calibrate, and operate complex instruments; analyze computations; and conduct tests. They also assist engineers and scientists in developing experimental equipment and models by making drawings and sketches; and under an engineer's direction they frequently do routine design work.

In production, technicians usu-

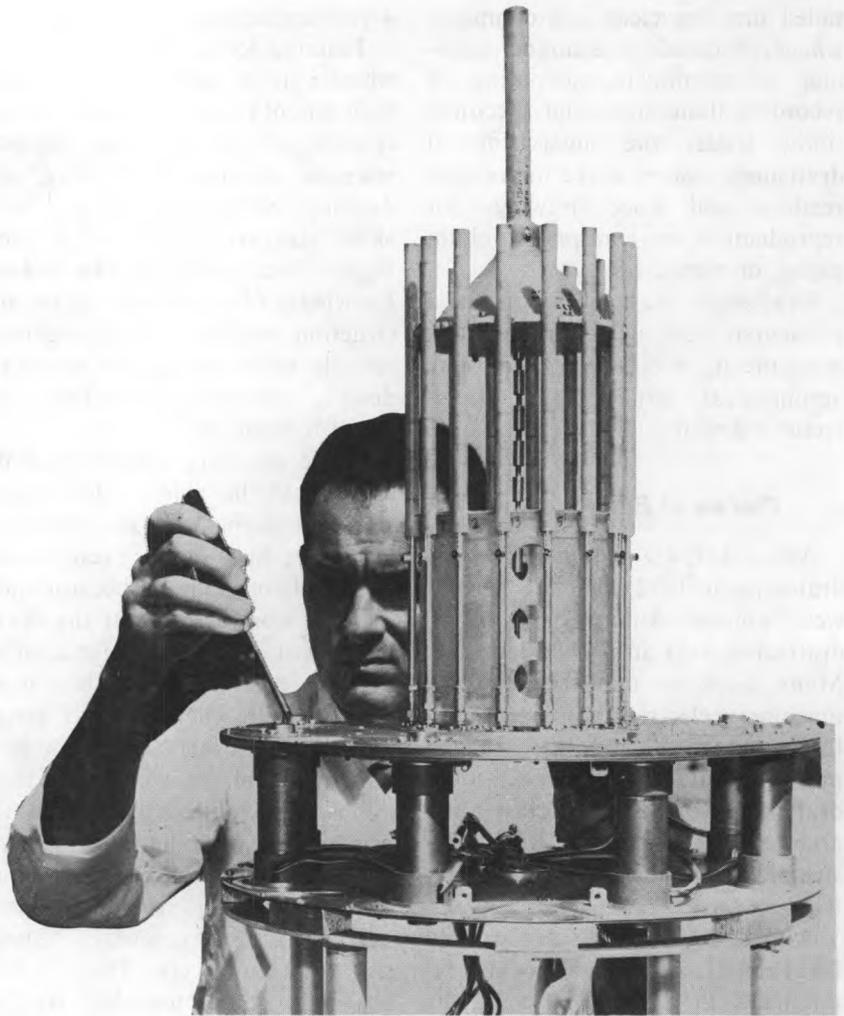
ally follow the plans and general directions of engineers and scientists, but often without close supervision. They may prepare specifications for materials, devise tests to insure product quality, or study ways to improve the efficiency of an operation. They often supervise production workers to make sure they follow prescribed plans and procedures. As a product is built, technicians check to see that specifications are followed, keep engineers and scientists informed as to progress, and investigate production problems.

As salesmen or field representa-

tives for manufacturers, technicians give advice on installation and maintenance problems of complex machinery, and may write specifications and technical manuals. (See statement on Technical Writers elsewhere in the *Handbook*.)

Job titles of engineering and science technicians may describe the level (biological aid or biological technician), duties (quality control technician or time study analyst), or area of work (mechanical, electrical, or chemical).

Aeronautical Technology. Technicians in this area work with engi-



Technician adjusts experimental antenna equipment.

neers and scientists to design and produce aircraft, helicopters, rockets, guided missiles, and spacecraft. Many aid engineers in preparing design layouts and models of structures, control systems, or equipment installations by collecting information, making computations, and performing laboratory tests. For example, under the direction of an engineer, a technician might estimate weight factors, centers of gravity, and other items affecting load capacity of an airplane or missile. Other technicians prepare or check drawings for technical accuracy, practicability, and economy.

Aeronautical technicians frequently work as manufacturer's field service representatives, serving as the link between their company and the military, commercial airlines, and other customers. Technicians also prepare technical information for instruction manuals, bulletins, catalogs, and other literature. (See statements on Aerospace Engineers, Airplane Mechanics, and Occupations in Aircraft, Missile and Spacecraft Manufacturing elsewhere in the *Handbook*.)

Air-Conditioning, Heating, and Refrigeration Technology. Air conditioning, heating, and refrigeration technicians design, manufacture, sell, and service equipment to regulate interior temperatures. Technicians in this field often specialize in one area, such as refrigeration, and sometimes in a particular type of activity, such as research and development.

When working for firms that manufacture temperature controlling equipment, technicians generally work in research and engineering departments, where they assist engineers and scientists in the design and testing of new equipment or production methods. For example, a technician may construct an

experimental model to test its durability and operational characteristics. Technicians also work as field salesmen for equipment manufacturers or dealers, and must be able to supply engineering firms and other contractors that design and install systems with information on installation, maintenance, operating costs, and the performance specifications of the equipment. Other technicians work for contractors, where they help design and prepare installation instructions for air-conditioning, heating, or refrigeration systems. Still others work in customer service, and are responsible for supervising the installation and maintenance of equipment. (See statement on Refrigeration and Air-Conditioning Mechanics elsewhere in the *Handbook*.)

Chemical Technicians. These technicians work with chemists and chemical engineers to develop, sell, and utilize chemical and related products and equipment.

Most chemical technicians do research and development, testing, or other laboratory work. They often set up and conduct tests on processes and products being developed or improved. For example, a technician may examine steel for carbon, phosphorous, and sulfur content or test a lubricating oil by subjecting it to changing temperatures. The technician measures reactions, analyzes the results of experiments, and records data which will be the basis for decisions and future research.

Chemical technicians in production generally put into commercial operation those products or processes developed in research laboratories. They assist in making the final design, installing equipment, and training and supervising operators on the production line. Technicians in quality control test materials,

production processes, and final products to insure that they meet the manufacturer's specifications and quality standards. Many also work as technical salesmen of chemicals or chemical products.

Many chemical technicians use computers and instruments, such as a dilatometer, to measure the expansion of a substance. Because the field of chemistry is so broad, chemical technicians frequently specialize in a particular industry such as food processing or pharmaceuticals. (See statements on Chemists, Chemical Engineers, Food Processing Technicians, and Occupations in the Industrial Chemical Industry elsewhere in the *Handbook*.)

Civil Engineering Technology. Technicians in this area assist civil engineers in planning, designing, and constructing highways, bridges, dams, and other structures. During the planning stage, they may help estimate costs, prepare specifications for materials, or participate in surveying, drafting, or designing. Once construction begins, they may assist the contractor or superintendent in scheduling construction activities or inspecting the work to assure conformance to blueprints and specifications. (See statements on Civil Engineers, Draftsmen, and Surveyors elsewhere in the *Handbook*.)

Electronics Technology. Technicians in this field develop, manufacture, and service a wide range of electronic equipment and systems. They may work with radio, radar, sonar, television, and other communication equipment; industrial and medical measuring or control devices; navigational equipment; electronic computers, and many other types of electronic equipment. Because the field is so broad, technicians often specialize in one area such

as automatic control devices or electronic amplifiers. Furthermore, technological advancement is constantly opening up new areas of work. For example, the development of printed circuits stimulated the growth of micro-miniaturized electronic systems.

When working in design, production, or customer service, electronic technicians use sophisticated measuring and diagnostic devices to analyze and test equipment. In many cases, they must understand the requirements of the field in which the electronic device is being used. In designing equipment for space exploration, for example, they must consider the need for minimum weight and volume and maximum resistance to shock, extreme temperature, and pressure. Electronics technicians also do technical writing and work in technical sales. (See statements on Broadcast Technicians and Occupations in Radio and Television Broadcasting elsewhere in the *Handbook*.)

Industrial Production Technology. Technicians in this area, sometimes called industrial or production technicians, assist industrial engineers on problems involving the efficient use of personnel, materials, and machines to produce goods and services. They prepare layouts of machinery and equipment, plan the flow of work, make statistical studies, and analyze production costs. Industrial technicians also conduct time and motion studies (analyze the time and movements a worker needs to accomplish a job task) to improve the efficiency of an operation.

While working, many industrial technicians acquire experience which enables them to qualify for other jobs. For example, those specializing in machinery and production methods may move into industrial

safety. Others, in job analysis, may set job standards and interview, test, hire, and train personnel. Still others may move into production supervision. (See statements on Personnel Workers and Industrial Engineers elsewhere in the *Handbook*.)

Mechanical Technology. Mechanical technology is a broad term which covers a large number of specialized fields including automotive technology, diesel technology, tool design, machine design, and production technology.

Technicians assist engineers in design and development work by making freehand sketches and rough layouts of proposed machinery and other equipment and parts. This work requires knowledge of mechanical principles involving tolerance, stress, strain, friction, and vibration factors. Technicians also analyze the costs and practical value of designs.

In planning and testing experimental machines and equipment for performance, durability, and efficiency, technicians record data, make computations, plot graphs, analyze results, and write reports. They sometimes recommend design changes to improve performance. Their job often requires skill in the use of instruments, test equipment and gauges, as well as preparation and interpretation of drawings.

When a product is ready for production, technicians help prepare layouts and drawings of the assembly process and parts to be manufactured. They frequently help estimate labor costs, equipment life, and plant space. Some mechanical technicians test and inspect machines and equipment in manufacturing departments or work with engineers to eliminate production problems. Others are technical salesmen.

Tool designers are among the

better known specialists in mechanical engineering technology. Tool designers design tools and devices for mass production, and frequently redesign existing tools to improve their efficiency. They prepare sketches of the designs for cutting tools, jigs, dies, special fixtures, and other attachments used in machine operations. They also may make or supervise others in making detailed drawings of tools and fixtures.

Machine drafting, with some designing, is another major area often grouped under mechanical technology and is described in the statement on draftsmen. (See statements on Mechanical Engineers, Automobile Mechanics, Manufacturer's Salesmen, and Diesel Mechanics elsewhere in the *Handbook*.)

Instrumentation Technology. Automated manufacturing and industrial processes, oceanographic and space exploration, weather forecasting, satellite communication systems, environmental control, and medical research have helped to make instrumentation technology a fast-growing field for technicians. They help develop and design complex measuring and control devices such as those in a spacecraft that sense and measure changes in heat or pressure, automatically record data, and make necessary adjustments. These technicians have extensive knowledge of physical sciences as well as electrical-electronic and mechanical engineering. (See statement on Instrument Workers elsewhere in the *Handbook*.)

Technicians also specialize in other fields such as metallurgical (metal), electrical, and optical technology. In the atomic energy field, technicians work with scientists and engineers on problems of radia-



Technician uses optical tracking instrument to record data.

tion safety, inspection, and decontamination. (See statement on Occupations in the Atomic Energy Field elsewhere in the *Handbook*.) New areas of work include the environmental control field, where technicians study the problems of air and water pollution and industrial safety.

Places of Employment

Over 700,000 persons worked as engineering and science technicians in 1972—12 percent were women.

More than 475,000 (about 7 out of 10) worked in private industry. The manufacturing industries employ the largest numbers in the electrical equipment, chemicals, machinery, and aerospace industries. In non-manufacturing, large numbers worked in wholesale and retail trade, communications, and in engineering and architectural firms.

In 1972, the Federal Government employed over 100,000 technicians chiefly as engineering aids and technicians, equipment specialists, biological technicians, cartographic

technicians (map making), meteorological technicians and physical science technicians. The largest number worked for the Department of Defense; most of the others worked for the Departments of Transportation, Agriculture, Interior, and Commerce.

State Government agencies employed over 50,000 engineering and science technicians, and local governments about 11,000. The remainder worked for colleges and universities and nonprofit organizations.

Training, Other Qualifications, and Advancement

Men and women can qualify for technician jobs through many combinations of work experience and education because employers traditionally have been quite flexible in their hiring standards. However, most employers prefer applicants who have had some specialized technical training. Specialized training is available at technical institutes, junior and community colleges, area vocational-technical schools, extension divisions of colleges and universities, and technical-vocational high schools.

Besides academic training, persons can qualify for technician jobs by less formal methods. Workers may learn through on-the-job training programs or courses in post-secondary or correspondence schools. Some qualify from experience in technical jobs in the Armed Forces. Many engineering and science students who have not completed the bachelor's degree and others who have degrees in science and mathematics are able to qualify after additional technical training and experience. Post-secondary training is increasingly necessary for the more responsible jobs and for advancement.

Some of the types of post-secondary and other schools which provide technical training are discussed in the following paragraphs:

Technical Institutes. Technical institutes offer training to qualify students for a job immediately after graduation with only a minimum of on-the-job training. In general, students receive intensive technical training but less theory and general education than in engineering schools or liberal arts colleges. A few technical institutes and community colleges offer cooperative programs; students spend part of the time in school and part in paid employment related to their studies.

Some technical institutes operate as regular or extension divisions of colleges and universities. Other institutions are operated by States and municipalities, or privately.

Junior Colleges and Community Colleges. Curriculums in junior and community colleges which prepare students for technician occupations are similar to those in the freshman and sophomore years of 4-year colleges. After completing the 2-year program graduates can transfer to 4-year colleges or qualify for some technician jobs. Most large community colleges offer 2-year technical programs, and many employers prefer graduates having more specialized training. Junior college courses in technical fields often are planned around the employment needs of the local area.

Area Vocational-Technical Schools. These post-secondary public institutions serve students from surrounding areas and train them for jobs in the local area. Most of these schools require a high school degree or its equivalent for admission.

Other Training. Some large corporations conduct training pro-

grams and operate private schools to meet their needs for technically trained personnel in specific jobs; such training rarely includes general studies. Training for some technician occupations, for instance tool designers and electronic technicians, is available through formal 2-to-4 year apprenticeship programs. The apprentice gets on-the-job training under the close supervision of an experienced technician and related technical knowledge in classes, usually after working hours.

The Armed Forces have trained many technicians, especially in electronics. However, military job requirements are generally different from those in the civilian economy. Thus, military technician training may not be adequate for civilian technician work, and additional training may be necessary for employment.

Technician training also is available from many private technical schools that specialize in a single field such as electronics. Some of these schools are owned and operated by large corporations that have the resources to provide very up-to-date training in a technical field. Correspondence schools provide technical training for those who wish to learn more about their job.

Those interested in a career as a technician should have an aptitude for mathematics and science, and enjoy technical work. An ability to do detailed work with a high degree of accuracy is necessary; for design work, creative talent also is desirable. Since technicians are part of a scientific team, they sometimes must work under the close supervision of engineers and scientists as well as with other technicians and skilled workers.

Engineering and science technicians usually begin work as trainees in routine positions under

the direct supervision of an experienced technician, scientist, or engineer. As they gain experience, they receive more responsibility and carry out a particular assignment under only general supervision. Technicians may eventually move into supervisory positions. Those who have the ability and obtain additional education are sometimes promoted to science or engineering positions.

Employment Outlook

Employment opportunities for engineering and science technicians are expected to be favorable through the mid-1980's. Opportunities will be best for graduates of post-secondary school technician training programs. Besides the very rapid growth expected in this field, additional technicians will be needed to replace those who die, retire, or leave the occupation.

Industrial expansion and increasing complexity of modern technology underlie the anticipated increase in demand for technicians. Many will be needed to work with a growing number of engineers and scientists in developing, producing, and distributing new and technically advanced products. Automation of industrial processes and growth of new work areas such as atomic energy, environmental control, and urban development will add to the demand for technical personnel.

The anticipated growth of research and development (R&D) expenditures in industry and government should increase demand for technicians. However, this growth is expected to be slower than in the past because of the anticipated slowdown of the space and defense components of Federal R&D expenditures.

Because space and defense programs are major factors in the em-

ployment of technical personnel, expenditures in these areas affect the demand for technicians. The outlook for technicians is based on the assumption that defense spending will be slightly lower than the levels of the late 1960's. If defense spending should differ substantially from this level, the demand for technicians would be affected accordingly.

Earnings

In general, technicians' earnings depend on their education, and technical specialty, as well as their ability and work experience. Other important factors influencing earnings are the type of firm, specific duties, and geographic location.

In early 1973, Federal Government agencies paid beginning engineering and science technicians with an associate degree \$6,882; those with a bachelor's degree had starting salaries of \$7,694, or \$9,520 depending on the type of job vacancy and the applicant's education and other qualifications. Some Federal Government agencies hire and train high school graduates for technician jobs. Beginning salaries for these jobs were \$5,432 a year.

Starting salaries in private industry in 1972 for technicians holding associate degrees averaged about \$7,700 per year; those with a bachelor's degree averaged almost \$10,000 a year.

Most technicians can look forward to an increase in earnings as they move to higher positions. According to a Bureau of Labor Statistics survey, in 1972 annual salaries of workers in responsible technician positions in private industry averaged about \$12,000—almost twice as much as the average earnings of nonsupervisory workers in private industry, except farming.

Sources of Additional Information

General information on careers for engineering and science technicians is available from:

American Society for Engineering Education, Suite 400, 1 Dupont Circle, Washington, D.C. 20036

Engineers Council for Professional Development, 345 East 47th St., New York, N.Y. 10017.

National Council of Technical Schools, 1835 K St. NW., Room 907, Washington, D.C. 20006.

Information on schools offering technical programs is available from the Engineers Council for Professional Development, a nationally recognized accrediting agency for engineering technology programs; the National Council of Technical Schools; and the U.S. Department of Health, Education, and Welfare, Office of Education, Washington, D.C. 20202.

State departments of education at each State capital also have information about approved technical institutes, junior colleges, and other educational institutions within the State offering post-high school training for specific technical occupations. Other sources include:

American Association of Junior Colleges, Suite 410, 1 Dupont Circle, Washington, D.C. 20036.

National Home Study Council, 1601 18th St. NW., Washington, D.C. 20009.

National Association of Trade and Technical Schools, 2021 L St., NW., Washington, D.C. 20036.

FOOD PROCESSING TECHNICIANS

(D.O.T. 022.281, 029.381)

Nature of the Work

Unlike man's experience of the past, when food was processed and prepared in the home, much of the food we eat today is processed and prepared by industrial firms and sold at local supermarkets. A relatively small but important number of technicians work for these industrial firms in all areas of food technology, from the development of new products and processing techniques to production, food quality inspection, and marketing.

Titles of technicians in the food processing industry vary from plant to plant, as do technicians' responsibilities. Food processing technicians are known as Laboratory or Quality Assurance Technicians, Physical Science Aides, Plant Facilities Technicians, Biological Aides, Laboratory Analysts, and Research and Development Technicians.

In research and development, food processing technicians assist food scientists in improving existing food products, creating new food items, and developing and improving processes related to production. Duties may include separating and weighing the ingredients of a product and conducting microbiological and chemical analyses of these substances. Technicians also set up samples to test flavor, color, and textural characteristics of foods to insure that they will appeal to consumers. Their work often involves operating and maintaining laboratory equipment such as balances, microscopes, test tubes, and cryoscopes (instruments that determine the freezing point of liquids). Technicians frequently



Food processing technicians help create new food items.

write reports on experiments, tests, and other projects.

In quality assurance laboratories, technicians insure conformity with established industry and government standards by testing both raw ingredients and finished products bacteriologically, chemically, and physically. They may test food samples taken from the production line for bacteria and other possible forms of contamination. Technicians may also examine samples for protein and vitamin content, as well as for color, flavor, and texture, to pro-

tect the quality of a product. This work involves the use of equipment such as incubators, color comparison charts, and pH meters (to determine the degree of acidity). Technicians record their findings and sometimes recommend changes in processing techniques.

In production, food processing technicians help supervise processing of food products. They often work closely with fieldmen (company technicians who help farmers produce the best types of food) to insure a steady flow of products from farm to plant. They inspect

incoming raw materials to insure suitability for processing and storage under proper conditions. Technicians, working closely with plant managers, recommend measures to improve production methods, equipment performance, and product quality. They also suggest changes in working methods and use of equipment to increase processing efficiency. Some technicians supervise cooking or packaging operations; others are concerned primarily with sanitation in all areas of a food processing plant. They help identify bacterial problems on the line or in the plant, recommend cleaning and sanitizing solutions, and direct cleaning crews.

Technicians in the food processing industry frequently work as manufacturers' technical salesmen providing nutritional and cost information to prospective customers. Many others work as food buyers for supermarket chains where their knowledge of food technology is used to select the best packaged and fresh foods for their companies.

Places of Employment

About 4,500 food processing technicians worked in the food processing industry in 1972. These technicians work for all major food processing firms. Food processing technicians are found in most States; however, the largest numbers are in those States having the heaviest concentration of food processing plants: California, Illinois, Pennsylvania, Texas, Ohio, New Jersey, Wisconsin, Michigan, Iowa, and New York.

Food technicians, in addition to being employed by food processors, may work for State and Federal food inspection agencies, food brokers, and supermarket chains.

(See statement on Health and Regulatory Inspectors elsewhere in the *Handbook*.) Others work in related fields where their specialized training can be utilized—including food packaging companies, food warehousing and transporting companies, and manufacturers of food processing equipment.

Training, Other Qualifications, and Advancement

Men and women who wish to prepare for careers as food processing technicians can obtain the necessary training from a variety of educational institutions, or can qualify for their work on the job. Most employers, however, prefer to hire those who have had some form of specialized training. Formal training programs are offered in post-secondary schools, such as technical institutes, junior and community colleges, and technical divisions of four-year universities. Most schools offering post-secondary technician training require a high school diploma for admittance. Some post-secondary schools admit students on the basis of successful work experience in the food industry and the recommendation of their employer.

Students preparing for careers as food processing technicians should take a year each of biology and chemistry, and two years of mathematics (algebra and geometry) while in high school. Statistics, English, and social science courses also are helpful.

Schools specializing in post-high school technical training offer one, two, and in very few cases, three or four-year programs. The majority are two-year programs leading to an associate of applied science degree. Programs usually include courses in chemistry, microbiology, mathematics, and

specialized study of food processing, quality control, packaging, plant and environmental sanitation, and technical report writing. Schools also generally offer elective courses such as accounting, economics, and English.

Curriculums may vary considerably among the schools offering programs in food science technology. Some schools for example, have programs in food processing technology geared towards an individual food processing industry, such as the dairy industry. Many two-year schools require work experience in some phase of the industry between the first and second year, and others suggest that their students obtain this kind of practical experience. The school's placement bureau often assists students in finding this type of employment. Besides providing practical experience, this aids students in paying their tuition expenses and frequently leads to full-time jobs after graduation.

Technicians also can qualify for jobs by completing on-the-job training programs, or through work experience and formal courses taken on a part-time basis. Also, many students from various science disciplines who have not completed all the requirements for a bachelor's degree are able to qualify for technician jobs after obtaining some additional technical training and experience. Although there are many ways to qualify for food processing technician jobs, post-secondary training is increasingly becoming a prerequisite for employment.

In the dairy industry, laboratory technicians must meet licensing requirements in most States. These requirements vary, but generally include a written test.

Food processing technicians generally work as part of a team.

Because the quality of processed food affects many people, the food technician must work to exacting standards and be dependable. They are frequently required to make oral or written reports on the results of their work.

Food processing technicians usually begin work as trainees under the direct supervision of an experienced food scientist, and are systematically assigned to jobs throughout the plant. Technicians may begin their careers at a lower level supervisory capacity and, depending on training, ability, and experience, may work up to the mid-management level. Food technicians working in laboratories receive more demanding assignments as they gain experience, and may advance to other positions such as salesmen, purchasing agents or fieldmen.

Employment Outlook

Employment opportunities for food processing technicians are expected to be favorable through the mid-1980's. Many technicians will be needed because of the moderate growth expected in the field and because of the need to replace those who die, retire, or transfer to other occupations. The demand will be strongest for graduates of post-secondary technical training programs.

The public's desire for more convenience foods in the home, and the need for these products by food service institutions are factors underlying the expected increase in demand for food processing technicians. Also, the complexity of processes involved in developing and marketing new food products will create a need for more technicians. This need will be especially critical in quality assurance areas, as higher quality and safety stand-

ards are set and as more technical supervision in processing become necessary. Many smaller processing firms, which currently operate without the aid of technicians, are expected to require them in the future.

Earnings

In general, technicians' earnings depend on their education, ability, and work experience. Other important factors are the type of firms for which they work, their specific duties, and the geographic location of their jobs. Beginning food processing technicians had average starting salaries of \$7,300 a year in 1972, according to limited data. Most technicians can look forward to an increase in earnings as they gain experience and advance to higher level positions.

Sources of Additional Information

For further information regarding careers as food processing technicians, students should contact their school counselors for help in locating technical institutes, junior and community colleges, and universities offering programs in food processing technology. (See Sources of Additional Information in the statement on Engineering and Science Technicians elsewhere in the *Handbook*.)

SURVEYORS

(D.O.T. 018.188)

Nature of the Work

Before engineers can plan a highway or other building projects, they need complete and accurate in-

formation about boundaries, land features, and other physical characteristics of the construction site. Surveyors measure construction sites, help establish official land boundaries, assist in setting land valuations, and collect information for maps and charts.

Surveyors (sometimes called party chiefs) are in charge of a field party that determines the precise measurements and locations of elevations, points, lines, and contours on the earth's surface, and distances between points. Surveyors are directly responsible for the field party's activity and the accuracy of their work. They plan the field work, select survey reference points, and determine the precise location of natural and man-made features of the survey region. They record the information disclosed by the survey, verify the accuracy of the survey data, and prepare sketches, maps, and reports.

A typical field party is made up of the surveyor and three to six other workers. *Instrumentmen* adjust and operate surveying instruments such as the theodolite (used to measure horizontal and vertical angles), and the altimeter (used to measure altitude). *Chainmen* use a steel tape or surveyor's chain to measure distances between surveying points. Generally chainmen work in pairs, one holding the head end of the tape to establish the most advanced measuring point and the other holding the rear end of the tape at the last established point. Chainmen also may mark measured points with painted stakes. *Rodmen* use a level rod, range pole, or other equipment to assist instrumentmen in determining elevations, distances, and directions. They hold and move the range pole according to hand or verbal signals of an instrumentman to help establish the exact point of measurement.

Rodmen also may clear brush from the survey line.

Surveyors often specialize in a particular type of survey. Besides doing *highway surveys*, many perform *land surveys* and locate boundaries of a particular tract of land. They then prepare maps and legal descriptions for deeds, leases, and other documents. Surveyors doing *topographic surveys* determine elevations, depressions, and contours of an area, and indicate the location of distinguishing surface features such as farms, buildings, forests, roads, and rivers.

Several closely related occupations are geodesy and photogrammetry. Geodesists measure immense areas of land, sea, or space by taking into account the earth's curvature and its geophysical characteristics. (See statement on Geophysicists elsewhere in the *Handbook*.) Photogrammetrists measure and interpret natural or man-made features of an area and make topographic maps by applying analytical processes and mathematical techniques to photographs obtained from aerial or ground surveys.

Places of Employment

About 58,000 people worked as surveyors in 1972; less than 5 percent were women.

Federal, State, and local government agencies employ almost one-third of all surveyors. Among the Federal Government agencies employing these workers are the U.S. Geological Survey, the Bureau of Land Management, the Army Corps of Engineers, and the Forest Service. Surveyors in State and local government agencies work mainly for highway departments and urban planning and redevelopment agencies.

A large number of surveyors work for construction companies

and for engineering and architectural consulting firms. A sizable number either work for or own firms that conduct surveys for a fee. Significant numbers of surveyors also work for crude-petroleum and natural gas companies, and for public utilities.

Training, Other Qualifications, and Advancement

A combination of post-secondary school courses in surveying and extensive on-the-job training is the most common method of entering surveying work. Junior colleges, technical institutes, and vocational schools offer 1, 2, and 3-year programs in surveying. Most surveying programs admit only high school graduates, preferably those who studied algebra, geometry, trigonometry, calculus, drafting, and mechanical drawing. With some post-secondary school courses in surveying, beginners generally start as instrumentmen. After gaining experience, they usually advance to party chief or surveyor. In many instances, promotions to higher level positions are based on written examinations as well as experience.

High school graduates with no formal training in surveying usually start as rodmen. After several years of on-the-job experience and some formal training in surveying, it is possible to advance to chainman, instrumentman, and finally to surveyor.

For those interested in a professional career in photogrammetry, a bachelor's degree in engineering or the physical sciences is usually needed.

All 50 States require licensing or registration of land surveyors responsible for locating and describing land boundaries. In some of these States, applicants for licenses need to know other types

of surveying in addition to land surveying. Requirements vary among the States but in general include a combination of 4 to 8 years' experience in surveying and passing an examination. Most States reduce the length of experience needed to take the licensing examination if the applicant has taken post-secondary courses in surveying.

In 1972, about 19,500 land surveyors were registered. In addition, about 16,000 engineers were registered to do land surveying, primarily as part of their civil engineering duties; however, these workers are considered engineers rather than surveyors. (See statement on Civil Engineers elsewhere in the *Handbook*.)

Qualifications for success as a surveyor include an ability to visualize objects, distances, sizes,

and other abstract forms and to make mathematical calculations quickly and accurately. Leadership qualities also are important as surveyors must supervise the work of others.

Members of a survey party must be strong and healthy to work outdoors and carry equipment over difficult terrain. They also need good eyesight, coordination, and hearing to communicate over great distances by hand signals or voice calls.

Employment Outlook

Employment opportunities for surveyors are expected to be good through the mid-1980's, especially for those with post-secondary school training. In addition to the openings resulting from the very rapid



Surveyors work in all types of terrain.

growth expected for the field, others will be needed to replace those who die, retire, or transfer to other fields of work.

The rapid development of urban areas and increased land values should create jobs for surveyors to locate boundaries for property records. Others will be needed to lay out streets, shopping centers, schools, and recreation areas. Construction and improvement of the Nation's roads and highways also will require many new surveyors.

Earnings and Working Conditions

In the Federal Government in early 1973, high school graduates with little or no training or experience started as rodmen or chainmen with an annual salary of \$5,432, and \$6,128 for those with one-year of related post-secondary training. Those with an associate degree and courses in surveying generally started as instrumentmen with an annual salary of \$6,882.

Starting salaries for people who had enough experience and training to qualify as a party chief or surveyor ranged from \$8,572 to \$9,520 per year. The majority of party chiefs in the Federal Government earned between \$8,000 and \$11,000 per year and some surveyors in high level positions earned more than \$14,000 per year.

Although salaries vary by geographic area, limited data indicate that salaries in private industry are generally comparable to those in Federal service and above the average earnings of nonsupervisory workers in private industry, except farming. Surveyors in private practice averaged \$12,000 a year in small limited practices and much greater amounts in large diversified practices.

Surveyors usually work an 8-hour, 5-day week. However, they sometimes work longer hours during the summer months when weather conditions are most suitable for surveying. The work of

surveyors is active and sometimes strenuous. They may stand for long periods and walk long distances or climb mountains with heavy packs of instruments and equipment. Because most work is out-of-doors, surveyors may be exposed to all types of weather. Some duties, such as planning surveys, preparing reports and computations, and drawing maps usually are done in an office.

Sources of Additional Information

Information about training and career opportunities in surveying is available from:

American Congress on Surveying and Mapping, Woodward Building, 733 15th St. NW., Washington, D.C. 20005.

General information on careers in photogrammetry is available from:

American Society of Photogrammetry
150 North Virginia Ave., Falls Church, Va. 22046.

HEALTH OCCUPATIONS

When people are sick or injured, the availability of health services becomes very important to them. These services depend not only on the number of people employed in health occupations, but also on their geographic distribution. Numbers employed have grown very rapidly in recent years. How to improve their distribution remains a problem which is being attacked on the national, State, and local levels.

About 3.8 million people worked in health-related occupations in 1972. Besides doctors, nurses, dentists, and therapists, these include the behind-the-scenes technologists, technicians, administrators, and assistants.

Registered nurses, physicians, pharmacists, and dentists constitute the largest professional health occupations; of these, the largest group in 1972 was registered nurses (750,000) and the smallest was dentists (105,000). Professional health occupations also include other medical practitioners (osteopathic physicians, chiropractors, optometrists, podiatrists, and veterinarians). Therapists (physical therapists) and administrators (hospital administrators and medical record administrators) also are professional health workers, as are dietitians and sanitarians.

Other health service workers include technicians of various types, such as dental hygienists, medical laboratory workers, and respiratory therapists.

Hospitals employ about half of all workers in the health field. Others work in clinics, laboratories, pharmacies, nursing homes, public health agencies, mental health centers, private offices, and patients' homes. Health workers are em-

ployed mainly in the more heavily populated and prosperous areas of the Nation.

Large numbers of women work in health occupations. Almost all nurses are women, as are most workers in the technician and therapist occupations. While more than nine of every ten medical practitioners are men, an increasing number of women have entered these occupations in recent years.

Training

The educational and other requirements for work in the health field are as diverse as the health occupations themselves. For example, professional health workers—physicians, dentists, pharmacists, and others—must complete a number of years of preprofessional and professional college education and pass a State licensing examination. On the other hand, some health service occupations can be entered with little specialized training. Many community and junior colleges have introduced courses recently to prepare students for various health occupations. In most of the occupations for which on-the-job-training has been the usual means of preparation, employers now prefer to hire persons who have completed one of these formal programs.

Earnings

People in health occupations that require graduation from college earn from one-and-a-half times to twice the average earnings for nonsupervisory workers in private industry other than farming. Health workers

include the highest paid occupation—physicians—and 8 of the top 15 occupations for which average yearly earnings are reported in this volume. Earnings for the health occupations that can be entered with up to 2 years of formal training are about the same as average earnings for nonsupervisory workers in private industry other than farming.

Outlook

Total employment in the health field is expected to grow very rapidly through the mid-1980's, although the rates of growth will differ considerably among individual health occupations. Among the factors that are expected to contribute to an increase in the demand for health care are population growth, increasing health consciousness, and rising standards of living. Expansion of coverage under payment programs that make it easier for persons to pay for hospitalization and medical care also will cause growth in the health service occupations. Other openings will be created each year by the increasing expenditures by Federal, State, and local governments for health care and services.

In addition to jobs created by employment growth, many new workers will be needed each year to replace those who retire, die, or—particularly for women—leave the field for other reasons.

Recent expansion of training programs in most of the occupations will add to the supply of trained health service personnel. The employment outlook in the various occupations ranges from excellent to competitive, depending on the balance between supply of workers and expected openings. See the individual statements for an outlook description for each occupation.

MEDICAL AND DENTAL PRACTITIONERS

Medical and dental practitioners work to prevent, cure, and alleviate disease. This group includes almost four times as many physicians as all other practitioners combined.

Physicians, osteopaths, and chiropractors treat diseases that affect the whole body; chiropractors and osteopaths emphasize manipulation of muscles and bones, especially the spine. Optometrists care for the eyes, and podiatrists treat foot diseases and deformities. Dentists examine and treat patients for oral diseases and abnormalities, such as decayed and impacted teeth. Veterinarians care for animals.

All of these occupations are closely regulated. States require that medical practitioners be licensed and pass a State board exam. Only physicians, osteopaths, podiatrists, dentists, and veterinarians can use surgery and drugs in their treatment.

Among the seven medical practitioner occupations, educational requirements for a license vary from 6 to 9 years after high school. Most schools of chiropractic require that students complete 2 years of college preceding their 4-year program. Optometrists, podiatrists, and veterinarians all must complete a minimum of 2 years of college before beginning the 4-year program. After graduation from college, osteopaths must complete a 4-year program and physicians and dentists generally must study an additional 3 or 4 years. Most States require a 1-year internship (supervised medical practice) for both physicians and osteopaths. Physicians who specialize must spend more years in residency at a hospital or health care institution and pass a specialty board examination.

The percentage of women medical

practitioners varies. Women make up less than 10 percent of these occupations, but this proportion represents a growth over the past few years. Student enrollments indicate that the proportion of women will continue to grow.

All medical practitioners must have the ability and perseverance to complete the years of study required. Medical practitioners should be emotionally stable, be able to make decisions in emergencies, and have a strong desire to help the sick and injured. Sincerity, understanding, and the ability to inspire confidence also are important qualities for medical practitioners.

CHIROPRACTORS

(D.O.T. 079.108)

Nature of the Work

Chiropractic is a system of treatment based on the principle that a person's health is determined largely by the nervous system, and that interference with this system impairs normal functions and lowers resistance to disease. Chiropractors treat patients primarily by manual manipulation of parts of the body, especially the spinal column.

Because of the emphasis of the importance of the spine and its position, most chiropractors use X-rays extensively to aid in locating the source of patients' difficulties. Many also use such supplementary measures as water, light, and heat therapy, and prescribe diet, exercise, and rest. Most State laws re-

strict the type of supplementary treatment permitted in chiropractic. Chiropractic as a system for healing does not include the use of drugs or surgery.

Places of Employment

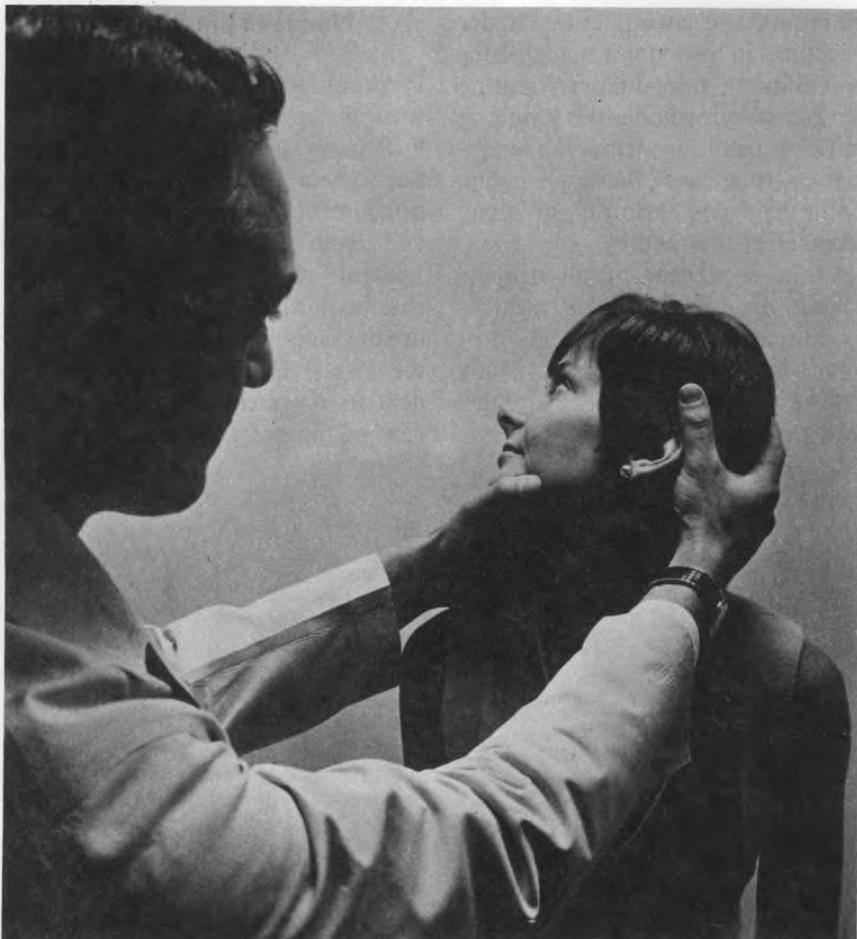
About 16,000 persons, 6 percent of them women, practiced chiropractic in 1972. Most chiropractors are in private practice. Some are salaried assistants of established practitioners or work for chiropractic clinics and industrial firms. Others teach or conduct research at chiropractic colleges. More than two-fifths of all chiropractors are located in California, New York, Texas, Missouri, and Ohio.

Training, Other Qualifications, and Advancement

Forty-eight States and the District of Columbia regulate the practice of chiropractic and grant licenses to chiropractors who meet certain educational requirements and pass a State board examination. The type of practice permitted and the educational requirements for a license vary considerably from one State to another. In 1972, Louisiana and Mississippi did not regulate the practice of chiropractic or issue licenses.

Most States require successful completion of a 4-year chiropractic course following high school graduation. About three-quarters of the States also require 2 years of college work in addition to chiropractic training. Nearly two-fifths of the States also require that chiropractors pass a basic science examination. Chiropractors licensed in one State may obtain a license in another State by reciprocity.

In 1972, there were 10 chiropractic colleges. Most require 2 years of college before entrance, and some



require that specific courses be taken during these 2 years. Some chiropractic colleges emphasize courses in manipulation and spinal adjustments. Others offer a broader curriculum, including subjects such as physiotherapy and nutrition. In most chiropractic colleges, the first 2 years of the curriculum are devoted chiefly to classroom and laboratory work in subjects such as anatomy, physiology, and biochemistry. During the last 2 years, students obtain practical experience in college clinics. The degree of Doctor of Chiropractic (D.C.) is awarded to students completing 4 years of chiropractic training.

Chiropractic requires considerable hand dexterity but not unusual strength or endurance. Persons de-

siring to become chiropractors should be able to work independently and handle responsibility. The ability to work with detail is important. Sympathy and understanding are among personal qualities considered desirable in dealing effectively with patients.

Most newly licensed chiropractors either set up a new practice or purchase an established one. Some start as salaried chiropractors to acquire experience and funds needed to establish their own practice. A moderate financial investment is usually necessary to open and equip an office.

Employment Outlook

Employment opportunities for

chiropractors are expected to be favorable through the mid-1980's. Most of the openings will be to replace those who die and retire.

Underlying the expected moderate growth in the occupation are an increase in the population and the trend to include chiropractic services in health insurance coverage, including Medicare and Medicaid.

Since most States require some college training and others are likely to require it in the next few years, the outlook is best for those who have completed 2 years of college in addition to the 4 years of chiropractic college.

Opportunities for new graduates to begin their own practice are likely to be best in those parts of the country where chiropractic is generally accepted as a method of health care. Opportunities also should be good for those who wish to enter salaried positions in chiropractic clinics, chiropractic colleges, and other organizations that employ chiropractors.

Earnings and Working Conditions

In chiropractic, as in other types of independent practice, earnings are relatively low in the beginning, but rise after the first few years. Incomes of chiropractors vary widely. Earnings for beginning chiropractors average about \$10,000 a year. Experienced chiropractors usually earn from \$14,000 to \$28,000 annually, with an average of about \$24,000, according to limited data available.

Sources of Additional Information

The State board of licensing in the capital of each State can supply information on State licensing requirements.

General information on chiropractic as a career and a list of

schools of chiropractic are available from:

American Chiropractic Association, 2200 Grand Ave., Des Moines, Iowa 50312.

International Chiropractors Association
741 Brady St., Davenport, Iowa 52808.

For information on requirements for admission to a specific chiropractic college, contact the admissions office of that school.

the mouth and jaws. The remainder specialize in pedodontics (dentistry for children); periodontics (treating the gums); prosthodontics (making artificial teeth or dentures); endodontics (root canal therapy); public health dentistry; and oral pathology (diseases of the mouth).

About 3 percent of all dentists teach in dental schools, do research, or administer dental health programs on a full-time basis. Many dentists in private practice do this work on a part-time basis.

Places of Employment

About 105,000 dentists were at work in the United States in 1972—9 of every 10 were in private practice. About 5,800 served as commissioned officers in the Armed Forces, and about 1,400 had other types of Federal Government positions—chiefly in the hospitals and clinics of the Veterans Administration and the Public Health Service. Women dentists represent only about 2 percent of the profession.

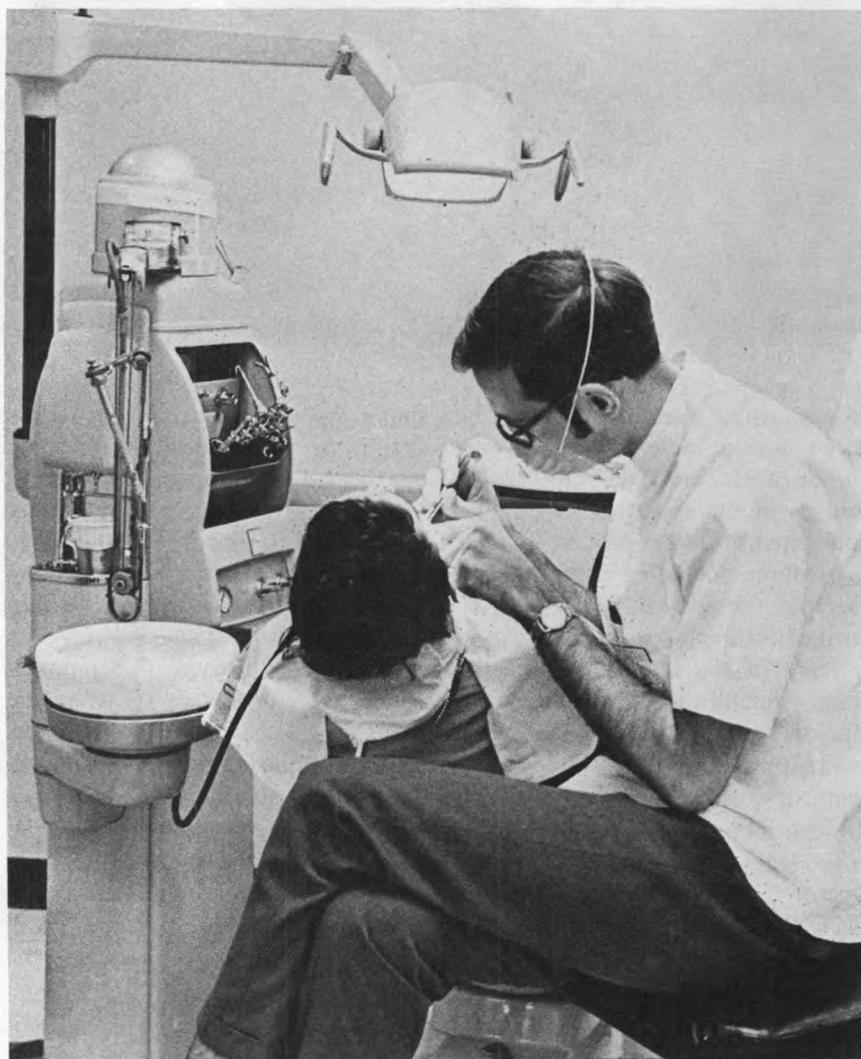
DENTISTS

(D.O.T. 072.108)

Dentists examine teeth and other tissues of the mouth to diagnose diseases or abnormalities. They take X-rays, fill cavities, straighten teeth, and treat gum diseases. Dentists extract teeth and substitute artificial dentures designed for the individual patient. They also perform corrective surgery of the gums and supporting bones. In addition, they may clean teeth.

Dentists spend most of their time with patients, but may devote some time to laboratory work such as making dentures and inlays. Many dentists, however—particularly in large cities—send most of their laboratory work to commercial firms. Some dentists also employ dental hygienists to clean patients' teeth and for other duties. (See statement on Dental Hygienists.) They also may employ other assistants who perform office work and assist in "chairside" duties.

Most dentists are general practitioners who provide many types of dental care; about 10 percent are specialists. The largest group of specialists are orthodontists, who straighten teeth. The next largest group, oral surgeons, operate in



Training, Other Qualifications, and Advancement

A license to practice dentistry is required in all States and the District of Columbia. To qualify for a license, a candidate must be a graduate of an approved dental school and pass a State board examination. In 1972, 49 States and the District of Columbia recognized the examination given by the National Board of Dental Examiners as a substitute for the written part of the State board examinations. Delaware also requires new graduates to serve 1 year of hospital internship, in addition to passing the written examination. Most State licenses permit dentists to engage in both general and specialized practice. In 13 States, however, a dentist cannot be licensed as a "specialist" unless he has had 2 or 3 years of graduate education and passes a special State examination. Few States permit dentists licensed in other States to practice in their jurisdictions without further examination.

Dental colleges require from 2 to 3 years of predental education. However, of those students entering dental school in 1971, 70 percent had a baccalaureate or master's degree. Predental education must include courses in the sciences and humanities.

Competition is keen for admittance to dental schools. In selecting students, schools give considerable weight to college grades and amount of college education. In addition, all dental schools participate in a nationwide admission testing program, and scores earned on these tests are considered along with information gathered about the applicant through recommendations and interviews. Many State-supported dental schools also give preference to residents of their particular States.

Dental school training generally

lasts 4 academic years although some institutions condense this into 3 calendar years. Studies begin with an emphasis on classroom instruction and laboratory work in basic sciences such as anatomy, microbiology, and physiology. The last 2 years are spent chiefly in a dental clinic, treating patients.

The degree of Doctor of Dental Surgery (D.D.S.) is awarded by most dental colleges. An equivalent degree, Doctor of Dental Medicine (D.M.D.) is conferred by 13 schools.

Dentists who want to do research, teach, or become specialists must spend an additional 2 to 4 years in advanced dental training in programs operated by dental schools, hospitals, and other institutions of higher education.

Dental education is very costly because of the length of time required to earn the dental degree. However, the Comprehensive Health Manpower Training Act of 1971 provides Federal funds for loans and scholarships of up to \$3,500 a year to help needy students pursue full-time study leading to the degree.

The profession of dentistry requires both manual skills and a high level of intelligence. Dentists should have good visual memory, excellent judgment of space and shape, delicacy of touch, and a high degree of manual dexterity, as well as scientific ability. The ability to instill confidence, self-discipline, and a good business sense are helpful for success in private practice.

Most dental graduates open their own offices or purchase established practices. Some start in practice with established dentists, to gain experience and to save the money required to equip an office; others may enter residency or internship training programs in approved hospitals. Dentists who enter the Armed Forces are commissioned as cap-

tains in the Army and Air Force and as lieutenants in the Navy. Graduates of recognized dental schools are eligible for Federal Civil Service positions and for commissions (equivalent to lieutenants in the Navy) in the U.S. Public Health Service.

Employment Outlook

Employment opportunities for dentists are expected to be very good through the mid-1980's. Dental school enrollments have grown in recent years because of Federally-assisted construction of additional training facilities. However, unless schools expand beyond present levels, the number of new entrants to the field is expected to fall short of the number needed to fill openings created by growth of the occupation and by those who die and retire from the profession.

Employment of dentists is expected to grow rapidly due to population growth, increased awareness that regular dental care helps prevent and control dental diseases, and the expansion of prepayment arrangements which make it easier for people to afford dental services. In addition, dental public health programs will need qualified administrators and dental colleges will need additional faculty members. Many dentists will continue to serve in the Armed Forces.

Improved dental hygiene and fluoridation of community water supplies may prevent some tooth and gum disorders, and preserve teeth that might otherwise be extracted. However, since the preserved teeth will need care in the future, these measures may increase rather than decrease the demand for dental care. New techniques, equipment, and drugs, as well as the expanded use of dental hygienists, assistants, and laboratory techni-

cians should enable individual dentists to care for more patients. However, these developments are not expected to offset the need for more dentists.

Earnings and Working Conditions

During the first year or two of practice, dentists often earn little more than the minimum needed to cover expenses, but their earnings usually rise rapidly as their practice develops. Specialists generally earn considerably more than general practitioners. The average income of dentists in 1972 was about \$34,000 a year, according to limited information available. In the Federal Government, new graduates of dental schools could expect to start at \$13,996 a year, in early 1973.

Location is one of the major factors affecting the income of dentists who open their own offices. For example, in high-income urban areas, dental services are in great demand; however, a practice can be developed most quickly in small towns, where new dentists easily become known and they may face less competition with established practitioners. Although the income from practice in small towns may rise rapidly at first, over the long run the level of earnings, like the cost of living, may be lower than it is in larger communities.

Most dental offices are open 5 days a week and some dentists have evening hours. Dentists usually work between 40 and 45 hours a week, although many spend more than 50 hours a week in the office. Dentists often work fewer hours as they grow older, and a considerable number continue in part-time practice well beyond the usual retirement age.

Sources of Additional Information

Persons who wish to practice in a

given State should get the requirements for licensure from the board of dental examiners of that State. Lists of State boards and of accredited dental schools, as well as information on dentistry as a career, is available from:

American Dental Association, Council on Dental Education, 211 East Chicago Ave., Chicago, Ill. 60611.

American Association of Dental Schools
1625 Massachusetts Ave. NW., Washington, D.C. 20036.

Students should contact the Director of Student Financial Aid at the school they attend to get information about Federal loans and scholarships.

OPTOMETRISTS

(D.O.T. 079.108)

Nature of the Work

About 2 out of every 5 persons in the United States need eye care. Optometrists provide most of this care. They examine people's eyes for vision problems, disease, and other abnormal conditions, and test for proper depth and color perception and the ability to focus and coordinate the eyes. When necessary, they prescribe lenses and treatment. Most optometrists supply the prescribed eyeglasses and fit and adjust contact lenses. Optometrists also prescribe corrective eye exer-



cises or other treatment not requiring drugs or surgery.

Although most optometrists are in general practice, some specialize in work with the aged or with children. Others work only with persons having partial sight who can be helped with microscopic or telescopic lenses. Still others are concerned with the visual safety of industrial workers. A few optometrists teach or do research.

Optometrists should not be confused with either ophthalmologists, sometimes referred to as oculists, or with dispensing opticians. Ophthalmologists are physicians who specialize in eye diseases and injuries, perform eye surgery, and prescribe drugs or other eye treatment, as well as lenses. Dispensing opticians fit and adjust eyeglasses according to prescriptions written by ophthalmologists or optometrists; they do not examine eyes or prescribe treatment. (See statement on Dispensing Opticians.)

Places of Employment

In 1972, there were about 18,700 practicing optometrists; about 3 percent were women.

Most optometrists are in single practice. Others are in partnerships or group practice with other optometrists or doctors as part of a professional health care team.

Some optometrists work in specialized hospitals and eye clinics and teach in schools of optometry. Others work for the Veterans Administration, public and private health agencies, and industrial health insurance companies. About 600 optometrists serve as commissioned officers in the Armed Forces. Optometrists also may act as consultants to engineers specializing in safety or lighting, educators in remedial reading, or serve as members of health advisory committees to Fed-

eral, State and local governments.

According to a recent survey, about 3 optometrists out of 5 practice in towns of under 50,000 population.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require that optometrists be licensed. Applicants for a license must have a Doctor of Optometry degree from an accredited optometric school and pass a State board examination. In some States, applicants are permitted to substitute the National Board of Optometry examination, given in the third and fourth year of optometric school, for the written State examination. Several States allow applicants to be licensed without lengthy examination if they have a license in another State.

The Doctor of Optometry degree requires a minimum of 6 years of college consisting of a 4 year professional degree program preceded by at least 2 years of preoptometric study at an accredited university, college, or junior college. In 1972, there were 12 optometric schools approved by the Council on Optometric Education of the American Optometric Association. Requirements for admission to these schools usually include courses in English, mathematics, physics, chemistry, and biology, or zoology. Some schools also require courses in psychology, social studies, literature, philosophy, and foreign languages.

Since most optometrists are self-employed, business ability, self-discipline, and the ability to deal with patients tactfully are necessary for success.

Most beginning optometrists enter into associate practice with an

optometrist or other health professional. Others either purchase an established practice or set up a new practice. Some take salaried positions to obtain experience and the necessary funds to enter their own practice.

Optometrists wishing to advance in a specialized field may study for a Master's or Doctor of Philosophy degree in physiological optics, neurophysiology, public health administration, health information and communication, and health education. Optometrists who enter the Armed Forces as career officers have the opportunity to work toward advanced degrees and to do vision research.

Employment Outlook

Employment opportunities for optometrists are expected to be favorable through the mid-1980's. New graduates from schools of optometry are expected to be adequate to fill the positions made available by the moderate employment growth in the occupation and the need to replace optometrists who die and retire.

An increase in the total population, especially in the groups most likely to need glasses—older people and white-collar workers—is the main factor contributing to the moderate growth expected in the occupation. Greater recognition of the importance of good vision for efficiency at school and work, and the possibility that more persons will have health insurance to cover optometric services, also should increase the demand for optometric services.

Earnings and Working Conditions

In 1972, net earnings of new optometry graduates averaged about \$13,000; experienced optometrists

averaged from \$26,000 to \$28,000 annually. Incomes vary greatly, depending upon location, specialization, and other factors. Optometrists entering solo practice begin at approximately the same income level as those entering associateship or group practice. However, after several years, the optometrist in associateship or partnership practice will earn substantially more than his solo practitioner counterpart.

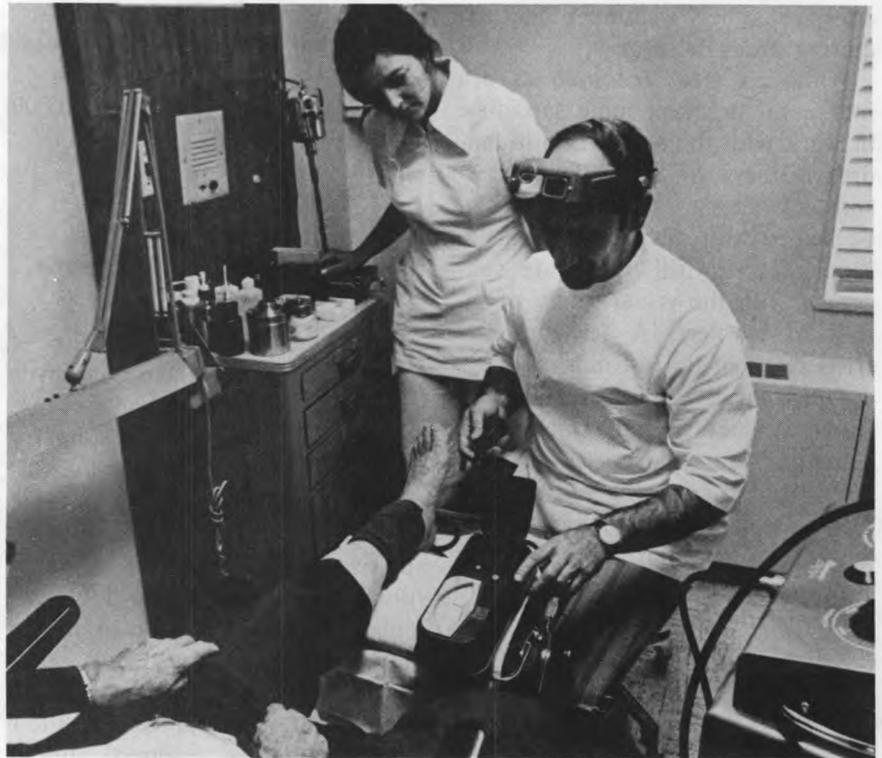
Independent practitioners can set their own work schedule. Some work over 40 hours a week, including Saturday. Since the work is not physically strenuous, optometrists often can continue to practice after the normal retirement age.

Sources of Additional Information

Information on optometry as a career and a list of scholarships and loan funds offered by various state associations, societies, and institutions are available from:

American Optometric Association
7000 Chippewa St., St. Louis, Mo.
63119.

Federal Health Professions Scholarships and Loans are available for up to \$3,500 per year for optometric students. For information on this financial aid and on required preoptometry courses contact individual optometry schools. The Board of Optometry in the capital of each State can supply a list of optometry schools approved by that State, as well as licensing requirements.



OSTEOPATHIC PHYSICIANS

(D.O.T. 071.108)

Nature of the Work

Osteopathic physicians diagnose, prescribe remedies, and treat diseases of the human body. They are particularly concerned about problems centered in the muscles or bones. The basic treatment or therapy used by osteopathic physicians centers on manipulating these systems with the hands. Osteopathic physicians also use surgery, drugs, and all other accepted methods of medical care.

Most osteopathic physicians are "family doctors" who engage in general practice. These physicians usually see patients in their offices, make house calls, and treat patients in osteopathic and some city and county hospitals. A few doctors of

osteopathy teach, do research, or write and edit scientific books and journals.

In recent years, specialization has increased. In 1972, about 10 percent were practicing specialties including internal medicine, neurology and psychiatry, ophthalmology, pediatrics, anesthesiology, physical medicine and rehabilitation, dermatology, obstetrics and gynecology, pathology, proctology, radiology, and surgery.

Places of Employment

About 13,800 osteopathic physicians were practicing in the United States in 1972; nearly 9 percent were women. Nearly all osteopathic physicians were in private practice. Less than 5 percent had full-time salaried positions in osteopathic hospitals and colleges, private industry, or government agencies.

Osteopathic physicians are lo-

cated chiefly in those States that have osteopathic hospital facilities. In 1972, almost half of all osteopathic physicians were in Michigan, Pennsylvania, Ohio, and Missouri. Twenty-three States and the District of Columbia each had fewer than 50 osteopathic physicians. More than half of all general practitioners are located in towns and cities having fewer than 50,000 people; specialists, however, practice mainly in large cities.

Training, Other Qualifications

A license to practice as an osteopathic physician is required in all States. To obtain a license, a candidate must be a graduate of an approved school of osteopathy and pass a State board examination. In 17 States and the District of Columbia, candidates must pass an examination in the basic sciences before they are eligible to take the professional examination; 36 States and the District of Columbia also require a period of internship in an approved hospital after graduation from an osteopathic school. The National Board of Osteopathic Examiners also gives an examination which is accepted by some states as a substitute for state examination. All States except Alaska and California grant licenses without further examination to properly qualified osteopathic physicians already licensed by another State.

Although 3 years of preosteopathic college work is the minimum entrance requirement for schools of osteopathy, almost all osteopathic students have a bachelors degree. Preosteopathic education must include courses in chemistry, physics, biology, and English. Osteopathic colleges require successful completion of 4 years of professional study for the degree

of Doctor of Osteopathy (D.O.). During the first 2 years of professional training, emphasis is placed on basic sciences such as anatomy, physiology, pathology and on the principles of osteopathy; the last 2 years are devoted largely to work with patients in hospitals and clinics.

After graduation, nearly all doctors of osteopathy serve a 12-month internship at 1 of the 73 osteopathic hospitals that the American Osteopathic Association has approved for intern training. Those who wish to become specialists must have 2 to 5 years of additional training, followed by 2 years of supervised practice in the specialty.

The osteopathic physician's training is very costly because of the length of time it takes to earn the D.O. degree. However, Federal funds for loans and scholarships of up to \$3,500 a year are available to help needy students pursue full-time study leading to the degree.

The seven schools of osteopathy admit students on the basis of grades received in college, scores on the required Medical College Admissions Test, and the amount of preosteopathic college work completed. The applicant's desire to serve as an osteopathic physician rather than as a doctor trained in other fields of medicine is a very important qualification. The colleges also give considerable weight to a favorable recommendation by an osteopathic physician familiar with the applicant's background.

Newly qualified doctors of osteopathy usually establish their own practice, although a growing number are entering group practice. A few work as assistants to experienced physicians or become associated with osteopathic hospitals. In view of the variation in

State laws, persons who wish to become osteopathic physicians should study carefully the professional and legal requirements of the State in which they plan to practice. The availability of osteopathic hospitals and clinical facilities also should be considered.

Persons who wish to become osteopathic physicians must have a strong desire to practice osteopathic principles of healing. They should have a keen sense of touch, emotional stability, and self-confidence. A pleasant personality, friendliness, patience, and the ability to deal with people also are important.

Employment Outlook

Opportunities for osteopathic physicians are expected to be very good through 1980. With the planned expansion of schools of osteopathy, by 1985 the number of osteopathic physicians available is expected to be in rough balance with the openings created by growth in the occupation and by those who die or retire from the profession. Greatest demand for their services probably will continue to be in States where osteopathy is a widely accepted method of treatment, such as Pennsylvania and a number of Midwestern States. Generally, prospects for beginning a successful practice are likely to be best in rural areas, small towns, and city suburbs, where the young doctor of osteopathy may establish his professional reputation more easily than in the centers of large cities.

The osteopathic profession is expected to grow very rapidly because of population growth; the extension of prepayment programs for hospitalization and medical care including Medicare and Medicaid; and the establishment of additional osteopathic hospital facilities.

Earnings and Working Conditions

In osteopathy, as in many of the other health professions, incomes usually rise markedly after the first few years of practice. Earnings of individual practitioners are determined mainly by ability, experience, geographic location, and the income level of the community served. In 1972, the average income of general practitioners after business expenses ranged from \$25,000 to \$35,000, according to limited data available. This income is very high in comparison with other professions. Specialists usually had higher incomes than general practitioners.

Many osteopathic physicians work more than 50 or 60 hours a week. Those in general practice work longer and more irregular hours than specialists.

Sources of Additional Information

People who wish to practice in a given State should find out about the requirements for licensure directly from the board of examiners of that State. Information on Federal scholarships and loans is available from the Director of Student Financial Aid at the individual schools of osteopathy. For a list of State boards, as well as general information on osteopathy as a career, contact:

American Osteopathic Association
212 East Ohio St., Chicago, Ill. 60611.

PHYSICIANS

(D.O.T. 070.101 and .108)

Nature of the Work

People in the United States visit a physician on the average of about 5 times a year either for treatment of an illness or injury or else for routine checkups. Physicians diagnose diseases and treat people who are suffering from injury or disease. They also try to prevent illness by advising patients on self-care related to diet and exercise. Physicians generally examine and treat patients in their own offices and in hospitals, but they may also visit patients at home.

About one-fifth of the physicians who provide patient care are general practitioners; the others specialize in 1 of the 33 fields recognized by the medical profession. The largest specialties are internal medicine, general surgery, obstetrics and gynecology, psychiatry, pediatrics, radiology, anesthesiology, ophthalmology, pathology, and orthopedic surgery.

Some physicians combine the practice of medicine with research or teaching in medical schools. Others hold full-time research or teaching positions or perform administrative work in hospitals, professional associations, and other organizations. A few are primarily engaged in writing and editing medical books and magazines.

Places of Employment

About 316,500 physicians were professionally active in the U.S. in 1972; more than 7 percent were women. About 9 out of 10 provided patient care services. Nearly 196,000 of these physicians had office practices; more than 86,000 others worked as interns, residents, or full-time staff in hospitals. Over

36,000 taught or performed administrative or research duties.

In 1972, 17,500 graduates of foreign medical schools served as hospital interns and residents in this country. To be appointed to approved internships or residencies in U.S. hospitals, these graduates (citizens of foreign countries as well as U.S. citizens) must pass the American Medical Qualification Examination given by the Educational Council for Foreign Medical Graduates.

The Northeastern States have the highest ratio of physicians to population and the Southern States, the lowest. General practitioners are much more widely spread geographically than specialists, who tend to be concentrated in large cities.

Training and Other Qualifications

All States and the District of Columbia require a license to practice medicine. To qualify for a license, a candidate must be a graduate of an approved medical school, pass a licensing examination, and in 34 States and the District of Columbia serve a 1-year hospital internship. Eighteen States and the District of Columbia require candidates to pass a special examination in the basic sciences to become eligible for the licensing examination.

Licensing examinations are given by State boards. The National Board of Medical Examiners also gives an examination which is accepted by 48 States and the District of Columbia as a substitute for State examinations. Although physicians licensed in one State usually can get a license to practice in another without further examination, some States limit this reciprocity.

In 1972, there were 110 approved schools in the United States in



which students could begin the study of medicine. One hundred seven award the degree of Doctor of Medicine (M.D.) to those who complete the course; 3 offer 2-year programs in the basic medical sciences to students who could then transfer to regular medical schools for the last semesters of study. Three new schools enrolled medical students for the first time during 1973.

Most medical schools require applicants to have completed at least 3 years of college education; some require 4 years. A few medical schools allow selected students who have exceptional qualifications to begin their professional study after 2 years of college. Most students who enter medical schools have a bachelor's degree.

Eleven States require various courses in premedical study such as undergraduate courses in English, physics, biology, and inorganic and

organic chemistry in an accredited college. Students should take courses in the humanities, mathematics, and the social sciences to acquire a broad general education. Other factors considered by medical schools in admitting students include the individual's college record and his scores on the Medical College Admission Test, which is taken by almost all applicants. Consideration also is given to the applicant's character, personality, and leadership qualities, as shown by personal interviews, letters of recommendation, and extracurricular activities in college. Many State-supported medical schools give preference to residents of their particular States and sometimes, those of nearby States.

The traditional curriculum leading to the M.D. degree is a 4-year course of study. However, more than 30 medical schools have shortened the curriculum or plan

to do so. Most of these are 3-year curriculums, but a few schools offer the M.D. degree within 6 years of high school graduation.

The first semesters of medical school training are spent primarily in laboratories and classrooms, learning basic medical sciences such as anatomy, biochemistry, physiology, pharmacology, microbiology, and pathology. During the last semesters, students spend most of their time in hospitals and clinics under the supervision of experienced physicians. They learn to take case histories, perform examinations, and recognize diseases.

Many new physicians acquire training beyond the 1-year hospital internship. Those who plan to be general or family practitioners often spend an additional year or two as interns or residents in a hospital. To become certified specialists, physicians must pass specialty board examinations. To qualify for these examinations, they must spend from 2 to 4 years—depending on the specialty—in advanced hospital training as residents, followed by 2 years or more of practice in the specialty. Some doctors who want to teach or do research take graduate work leading to the master's or Ph.D. degree in a field such as biochemistry or microbiology.

Medical training is very costly because of the long time required to earn the medical degree. However, many private scholarships and loans are available for medical education. In addition, Federal funds provide scholarships and loans for up to \$3,500 per year for students in the health professions who need financial aid.

Persons who wish to become physicians must have a strong desire to serve the sick and injured. They must be willing to study a great deal to keep up with the latest advances in medical science. Besides being

one of the most exacting sciences, medicine demands that practitioners strictly adhere to high moral standards subscribed to by the profession, law and tradition. Sincerity and a pleasant personality are assets that help physicians gain the confidence of patients. Prospective physicians should be emotionally stable and able to make decisions in emergencies.

The majority of newly qualified physicians open their own offices or join associate or group practices. Those who have completed their internships and enter active military duty initially serve as captains in the Army or Air Force or as lieutenants in the Navy. Graduates of medical schools are eligible for commissions as senior assistant surgeons (equivalent to lieutenants in the Navy) in the U.S. Public Health Service, as well as for Federal Civil Service professional medical positions.

Employment Outlook

The employment outlook for physicians is expected to be very good through 1985. Anticipated increases in graduates from existing and developing U.S. medical schools combined with foreign medical graduate entrants point to a greatly improved supply situation. This may result in an increasing movement of physicians into rural and other areas which have experienced shortage conditions in the past.

Foreign medical graduates are a large part of the new supply of physicians each year. In 1972, 1 new physician out of 3 was a foreign medical graduate. Even with the expansion of U.S. schools, by 1985 1 new physician out of 4 will still be a foreign medical graduate if their entry continues in line with past trends.

Even though the number of medical schools has increased in the last

few years, the competition for first year places in medical school is becoming even greater. In 1973, there were about 40,000 applicants for 14,000 positions.

Growth in population will create much of the need for more physicians. Also, a larger percentage of the population will be in the age group over 65, which uses increased physicians' services. Also, the effective demand for physicians' care will increase because of greater ability to pay, resulting from extension of prepayment programs for hospitalization and medical care, including Medicare and Medicaid, and continued Federal Government provision of medical care for members of the Armed Forces, their families, and veterans. More physicians will be needed, in addition, for medical research and administration, and for teaching in medical schools, as well as the continuing growth in the fields of public health, rehabilitation, industrial medicine, and mental health.

Recent concern over the distribution of physicians between specialties and general practice has resulted in creation of Federal funds for promotion of programs in family medicine. The new specialty of family practice has grown very rapidly since 1971, in keeping with the need for more M.D.'s who treat a variety of the more common illnesses.

To some extent, the rise in the demand for physicians' services will be offset by developments that will enable physicians to care for more patients. For example, increasing numbers of medical technicians are assisting physicians; new drugs and new medical techniques are shortening illnesses; and growing numbers of physicians are able to use their time more effectively by engaging in group practice. In addition, fewer house calls are being made by phy-

sicians because of the growing tendency to treat patients in hospitals and in physicians' offices.

The extent to which the developing health occupations, such as those of physicians' assistants and nurse practitioners, will enable each physician to treat more patients is as yet unknown. It is possible that these new health personnel will decrease the physicians' work significantly. In addition, legislation was passed in 1972 authorizing the Veterans Administration to assist States in the establishment of up to 8 new medical schools. As of mid-1973, no funds had been requested for the implementation of this legislation. However, if these schools were established, the increased number of physicians could create an oversupply in some geographic or specialty areas. Either a large increase in the number of physicians or the ability of each physician to treat more patients would force more physicians to establish their practice in sections of the country which have few doctors and to choose general practice or family medicine instead of one of the other specialties.

Earnings and Working Conditions

New graduates serving as interns in 1972 had an average annual salary of \$8,838 in hospitals affiliated with medical schools and \$10,076 in other hospitals. In 1972, residents earned average annual salaries of \$7,572 in hospitals affiliated with medical schools and \$9,418 in nonaffiliated hospitals, according to the American Medical Association. Many hospitals also provided full or partial room, board, and other maintenance allowances to their interns and residents.

Graduates employed by the Federal Government in 1973 received

an annual starting salary of about \$14,000 if they had completed their internship, and about \$16,700 if they had completed a 1-year residency.

Newly qualified physicians who establish their own practice must make a sizable financial investment to equip a modern office. During the first year or two of independent practice, physicians probably earn little more than the minimum needed to pay expenses. As a rule, however, their earnings rise rapidly as their practice develops.

Physicians have the highest average annual earnings of any occupational group. The net income of physicians who provided patient care services averaged about \$44,000 in 1972, according to limited information available. Earnings of physicians depend on factors such as the region of the country in which they practice; the patients' income levels; and the physician's skill, personality, and professional reputation, as well as the length of his experience. Self-employed physicians usually earn more than those in salaried positions, and specialists usually earn considerably more than general practitioners. Many physicians have long working days and irregular hours. Most specialists work fewer hours each week than general practitioners. As doctors grow older, they may accept fewer new patients and tend to work fewer hours. However, many continue in practice well beyond 70 years of age.

Sources of Additional Information

Persons who wish to practice in a given State should find out about the requirements for licensure directly from the board of medical examiners of that State. Information on Federal scholarships and loans is available from the Director

of Student Financial Aid at the individual medical schools. For a list of approved medical schools, as well as general information on premedical education, financial aid, and medicine as a career, contact:

Council on Medical Education, American Medical Association, 535 North Dearborn St., Chicago, Ill. 60610.

Association of American Medical Colleges, One Dupont Circle, NW., Washington, D.C. 20036.

women. Most podiatrists practice in large cities. The few who had full-time salaried positions worked mainly in hospitals, podiatric colleges, or for other podiatrists. The Veterans Administration and city health departments employ podiatrists on either a full- or part-time basis. Others serve as commissioned officers in the Armed Forces.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require a license for the practice of podiatry. To qualify for a license, an applicant must graduate from an accredited 4-year program in a college of podiatric medicine and pass a State board examination. Three States—Michigan, New Jersey, and Rhode Island—also require applicants to serve a 1-year internship in a hospital or clinic after graduation. Three-fourths of the States grant licenses without further examination to podiatrists licensed by another State.

The five colleges of podiatric medicine admit only students who have completed at least 2 years of college, including courses in English, chemistry, biology or zoology, physics, and mathematics.

The first 2 years in podiatry school include classroom instruction and laboratory work in basic sciences such as anatomy, bacteriology, chemistry, pathology, physiology, and pharmacology. During the final 2 years, students obtain clinical experience. The degree of Doctor of Podiatric Medicine (D.P.M.) is awarded upon graduation. Additional education and experience are generally necessary to practice in a specialty. Needy students may obtain loans and scholarships up to \$3,500 a year from Federal funds provided by the Com-

PODIATRISTS

(D.O.T. 079.108)

Nature of the Work

Podiatrists diagnose and treat foot diseases and deformities. They perform surgery, fit corrective devices, and prescribe drugs, physical therapy, and proper shoes. To help in diagnoses, they take X-rays and perform or prescribe blood and other pathological tests. Among the conditions podiatrists treat are corns, bunions, calluses, ingrown toenails, skin and nail diseases, deformed toes, and arch disabilities. They refer patients to medical doctors whenever the feet show symptoms of medical disorders affecting other parts of the body—such as arthritis, diabetes, or heart disease.

Some podiatrists specialize in foot surgery, orthopedics (bone, muscle, and joint disorders), podopediatrics (children's foot ailments), or podogeriatrics (foot problems of the elderly). However, most provide all types of foot care.

Places of Employment

About 7,300 persons practiced podiatry in 1972, 6 percent of them

prehensive Health Manpower Training Act of 1971.

Young people planning a career in podiatry should have a scientific aptitude, manual dexterity, and like detailed work. A good business sense, congeniality, and a sense of responsibility are additional assets in the profession.

Most newly licensed podiatrists set up their own practices. Some purchase established practices, or obtain salaried positions to gain the experience and money needed to begin their own practices.

Employment Outlook

Opportunities for graduates to establish new practices, as well as to enter salaried positions, should be favorable through the 1970's. Competition may increase in the 1980's, however, if the number of podiatry graduates increases as expected.

Through the mid-1980's, practice of podiatry is expected to grow moderately as a result of greater demand for health services by an expanding population, particularly the growing number of older people. This age group, the one needing the most foot care, is entitled to certain podiatrists' services under Medicare. Furthermore, the trend toward providing preventive foot care for children is increasing. More podiatrists will be needed to furnish services in hospitals, extended care facilities, and public health programs.

Earnings and Working Conditions

Experience and the income level and location of the community served have a great affect on earnings of individual podiatrists. Starting salaries of beginning podiatrists ranged from \$12,000 to \$16,000 in

1972, according to the limited available information. In podiatry, as in many other professions, incomes usually rise markedly after the first years of practice. Net income of podiatrists with five or less years of practice averaged about \$21,000; with from 5/10 years' experience, \$34,000.

The work week is generally 40 hours, and they may set their hours to suit their practice.

Sources of Additional Information

Information on license requirements in a particular State may be obtained from the State board of examiners in the State capital.

A list of colleges of podiatric medicine, entrance requirements, curriculums, and scholarships are available from:

American Association of Colleges of Podiatric Medicine, 20 Chevy Chase Circle, NW., Washington, D.C. 20015.

Additional information on podiatry as a career may be obtained from:

American Podiatry Association, 20 Chevy Chase Circle, NW., Washington, D.C. 20015.

VETERINARIANS

(D.O.T. 073.081 through .281)

Nature of the Work

Veterinarians (doctors of veterinary medicine) diagnose, treat, and control diseases and injuries among animals. Their work is important for the Nation's food production. It is also important for public health, because it helps to prevent the outbreak and spread of animal

diseases, many of which can be transmitted to human beings.

Veterinarians treat animals in hospitals and clinics or on the farm and ranch. They perform surgery on sick and injured animals and prescribe and administer drugs, medicines, and vaccines.

About two-fifths of all veterinarians treat small animals or pets. A large number specialize in the health and breeding of cattle, poultry, sheep, swine, or horses. Many veterinarians inspect meat, poultry, and other foods as part of Federal and State public health programs. Others teach in veterinary colleges. Some do research related to animal diseases, foods and drugs, or work as part of a medical research team to seek knowledge about prevention and treatment of human disease.

Places of Employment

About 26,000 veterinarians—3 percent of them women—were practicing in 1972. About three-fifths of all veterinarians were in private practice. The Federal Government employed more than 2,500 veterinarians, chiefly in the U.S. Department of Agriculture and the U.S. Public Health Service. About 900 more were commissioned officers in the veterinary corps of the Army and Air Force. Other employers of veterinarians are State and local government agencies, international health agencies, colleges of veterinary medicine, medical schools, research and development laboratories, large livestock farms, animal food companies, and pharmaceutical companies that manufacture drugs for animals.

Although veterinarians are located in all parts of the country, the type of practice generally varies according to geographic setting. Veterinarians in rural areas chiefly

treat farm animals; those in small towns usually engage in general practice; those in cities and suburban areas often limit their practice to pets.

Training, Other Qualifications, and Advancement

Veterinarians must be licensed to practice in all States and the District of Columbia. To obtain a license, applicants must have a Doctor of Veterinary Medicine (D.V.M. or V.M.D.) degree and pass a State board examination. A few States also require that applicants have some practical experience under the supervision of a licensed veterinarian. Some States issue licenses without further examination to veterinarians already licensed by

another State.

For positions in research and teaching, an additional master's or Ph.D. degree usually is required in a field such as pathology, physiology, or bacteriology.

Minimum requirements for the D.V.M. or V.M.D. degree are 2 years of preveterinary college work that emphasizes the physical and biological sciences, followed by 4 years of study in a college of veterinary medicine. However, two professional schools require 3 years of preveterinary study. Most veterinary school applicants have completed 3 to 4 years of college before entering the professional program. Veterinary college training includes considerable practical experience diagnosing and treating animal diseases and performing surgery, and labora-

tory work in anatomy, biochemistry, and other scientific and medical subjects.

There were 18 colleges of veterinary medicine in the United States in 1972. When selecting students for admission, these colleges considered primarily the applicants' scholastic records and the amount and character of their preveterinary training. Residents of the State in which the college is located usually are given preference since veterinary colleges are largely State supported. In the South and West, regional educational plans permit cooperating States without veterinary schools to send a few students to designated regional schools. In other areas, colleges which accept a certain number of students from other States usually give priority to applicants from nearby States that do not have veterinary schools.

Needy students may obtain loans and scholarships of up to \$3,500 a year to pursue full-time study leading to the degree of Doctor of Veterinary Medicine under provisions of the Comprehensive Health Manpower Training Act of 1971.

Most veterinarians begin as employees or partners in established practices. A few start their own practice with a modest financial investment in drugs, instruments, and an automobile. With a more substantial investment, one may open an animal hospital or purchase an established practice. Newly qualified veterinarians may enter the Army and Air Force as commissioned officers, or qualify for Federal positions as meat and poultry inspectors, disease-control workers, epidemiologists, or research assistants.

Employment Outlook

Employment opportunities for veterinarians are expected to be



favorable through the mid-1980's. The occupation is expected to grow very rapidly through the mid-1980's, primarily because of growth in the pet population, an increase in the numbers of livestock and poultry needed to feed an expanding population, and an increase in veterinary research. Emphasis on scientific methods of raising and breeding livestock and poultry and growth in public health and disease control programs also will contribute to the demand for veterinarians.

Earnings and Working Conditions

The incomes of veterinarians in private practice vary considerably, depending on such factors as location, type of practice, and years of experience. In 1972, the overall average income for veterinarians in private practice was \$25,000.

Newly graduated veterinarians employed by the Federal Govern-

ment started at \$11,782 a year in early 1973. Salaries of experienced veterinarians employed by the Department of Agriculture ranged between \$15,000 and \$29,000 a year. The income of veterinarians in private practice usually is higher than that of other veterinarians, according to the limited data available.

Veterinarians sometimes may be exposed to danger of physical injury, disease and infection. Those in private practice often have long and irregular working hours. Veterinarians in rural areas may have to spend much time traveling to and from farms and may have to work outdoors in all kinds of weather. Veterinarians often can continue working well beyond normal retirement age because of many opportunities for part-time work.

Sources of Additional Information

A pamphlet entitled *Today's Vet-*

erinarian, presents additional information on veterinary medicine as a career, as well as a list of colleges of veterinary medicine. A free copy may be obtained by submitting a request, together with a self-addressed stamped business size envelope, to:

American Veterinary Medical Association, 600 South Michigan Ave., Chicago, Ill. 60605.

Information on opportunities for veterinarians in the U.S. Department of Agriculture is available from:

Agricultural Research Service, U.S. Department of Agriculture, Hyattsville, Md. 20782.

Animal and Plant Health Inspection Service, Personnel Division, 12th and Independence Ave. SW., Washington, D.C. 20250.

Agricultural Marketing Service, Personnel Division, 12th and Independence Ave. SW., Washington, D.C. 20250.

OTHER HEALTH OCCUPATIONS

Many other highly skilled workers provide important health services in addition to medical practitioners. For many of these occupations at least a bachelor's degree is required, and for others college education is becoming increasingly essential. Some provide specialized types of health care, but others perform a broad range of services.

The following occupations are discussed in this section: Dental hygienists, dietitians, medical laboratory workers, medical record administrators, occupational therapists, pharmacists, physical therapists, registered nurses, respiratory therapists, sanitarians, and speech pathologists and audiologists.



DENTAL HYGIENISTS

(D.O.T. 078.368)

Nature of the Work

Dental hygienists remove deposits and stains from patients' teeth and apply prescribed medications to control dental decay. They take medical and dental histories; prepare diagnostic tests for interpretation by the dentist; and chart conditions of decay and disease for the dentists' use. They expose and develop dental X-ray films, sterilize instruments, and maintain patient records. They may mix filling compounds and act as chairside assistants to dentists. Hygienists also teach the techniques of mouth care and proper diet.

Dental hygienists who work in school systems examine children's teeth, assist dentists in determining

the dental treatment needed, and report their findings to parents. They also clean teeth and give instruction on correct mouth care. Some help to develop classroom or assembly programs on oral health. Dental hygienists employed by health agencies work in dental clinics. A few assist in research projects. Those having advanced training may teach in schools of dental hygiene.

Places of Employment

Nearly 17,000 persons, most of them women, worked as dental hygienists in 1972. Many work part time. Most work in private dental

offices. Public health agencies, school systems, industrial plants, clinics, hospitals, dental hygiene schools and the Federal Government also employ dental hygienists. Some who are graduates of bachelor's degree programs are commissioned officers in the U.S. Army.

Training and Other Qualifications

Dental hygienists must be licensed. To get a license, a candidate must be a graduate of an accredited dental hygiene school, except in Alabama, and pass both a written and clinical examination. In 1972, candidates in 48 States and the

District of Columbia could complete part of the State licensing requirements by passing a written examination given by the National Board of Dental Examiners.

In order to practice in a different State, a licensed dental hygienist must pass the State's examination. However, about 15 States grant licenses without further examination to dental hygienists already licensed in certain other States.

In 1972, about 150 schools of dental hygiene in the United States were accredited by the Council on Dental Education of the American Dental Association. Most of these schools provide a 2-year certificate or associate degree program. Some have 4-year programs leading to the bachelor's degree in dental hygiene and others offer both programs. Five schools offer master's degree programs.

Completion of the 2-year program is sufficient for dental hygienists who want to practice in a private dental office. In order to do research, teach, and work in public or school health programs, the completion of a 4-year program usually is required.

The minimum requirement for admission to a school of dental hygiene is graduation from high school. Several schools which offer the bachelor's degree admit students to the dental hygiene program only after they have completed 2 years of college. Many schools also require that applicants take an aptitude test given by the American Dental Hygienist's Association.

The curriculum at a school of dental hygiene consists of courses in the basic sciences, dental sciences, and liberal arts. These schools offer laboratory work, clinical experience, and classroom instruction in subjects such as anatomy, chemistry, histology, pathology, pharmacology, and nutrition.

People who want to become dental hygienists should enjoy working with others. The ability to put patients at ease in an uncomfortable situation is helpful. Personal neatness and cleanliness, manual dexterity, and good health also are important qualities.

Employment Outlook

Employment opportunities for dental hygienists are expected to be very good through the mid-1980's. Despite an anticipated rise in the number of graduates from schools of dental hygiene, the demand is expected to be greater than the number available for employment if current trends in enrollments continue.

Employment of dental hygienists is expected to rise very rapidly due to an expanding population and the growing awareness of the importance of regular dental care. Increased participation in dental prepayment plans and more group practice among dentists will result in new jobs for dental hygienists. Dental care programs for children also may lead to more employment opportunities in this field. In addition, a great number of job openings will be created by young women leaving their jobs for marriage and family responsibilities.

Mature women who wish to return to the field and those who desire part-time positions can expect to find very good opportunities for employment.

Earnings and Working Conditions

Earnings of dental hygienists are affected by the type of employer, education, and experience of the individual hygienists and the geographic location. Dental hygienists who work in private dental offices usually are salaried employees, al-

though some are paid a commission for work performed or a combination of salary and commission.

Salaries of dental hygienists who work in dentists' offices averaged about \$8,900 a year in 1972, according to the limited data available. This salary was about the same as the average for nonsupervisory workers in private industry, except farming. The beginning salary for a dental hygienist in the Federal Government ranged from \$6,882 to \$8,722 a year in early 1973, depending on education and geographic area.

Dental hygienists employed full time in private offices usually work between 35 and 40 hours a week. They may work on Saturdays or during evening hours. Some hygienists work for two or more dentists.

Dental hygienists work in clean, well-lighted offices. Important health protections for persons in this occupation are regular medical checkups and strict adherence to established procedures for using X-ray equipment and for disinfection.

Dental hygienists who work for school systems, health agencies, and the Federal or State governments have the same hours, vacation, sick leave, retirement, and health insurance benefits as other workers in these organizations.

Sources of Additional Information

For information about approved schools and the educational requirements needed to enter this occupation, contact:

Division of Educational Services, American Dental Hygienists Association, 211 East Chicago Ave., Chicago, Ill. 60611.

Other material on opportunities for dental hygienists is available from:

Division of Dental Health, Public Health Service, U.S. Department of Health, Education, and Welfare, Washington, D.C. 20201.

The State Board of Dental Examiners in each State, or the National Board of Dental Examiners, 211 East Chicago Ave., Chicago, Ill. 60611, can supply information on licensing requirements.

DIETITIANS

(D.O.T. 077.081 through .168)

Nature of the Work

Dietitians plan nutritious and appetizing meals to help people maintain or recover good health. They also supervise the food service workers who prepare and serve the meals, manage purchases and keep the accounts, and give advice on good eating habits. Administrative dietitians form the largest group in this occupation; the others are clinical, teaching, and research dietitians. Nutritionists also are included in this field.

Administrative dietitians apply the principles of nutrition and sound management to large-scale meal planning and preparation, such as that done in hospitals, universities, schools, and other institutions. They supervise the planning, preparation, and service of meals; select, train, and direct food-service supervisors and workers; budget for and purchase food, equipment, and supplies; enforce sanitary and safety regulations; and prepare records and reports. Dietitians who are directors of a dietetic department also decide on departmental policy; coordinate dietetic service

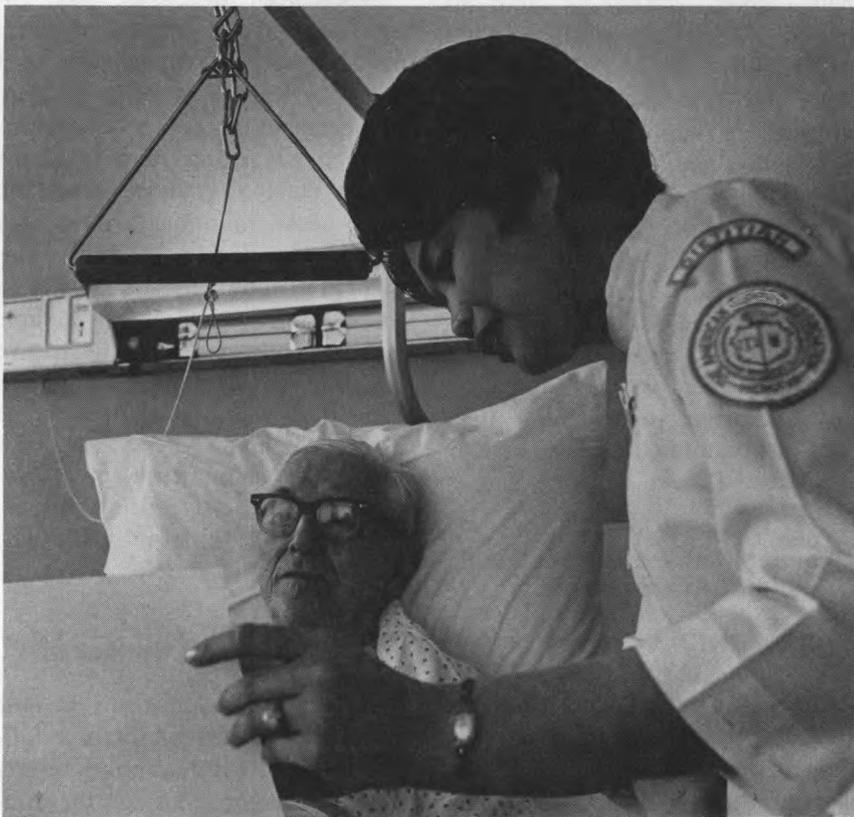
with the activities of other departments; and are responsible for the development and management of the dietetic department budget, which in large organizations may amount to millions of dollars annually.

Clinical dietitians, sometimes called therapeutic dietitians, plan diets and supervise the service of meals to meet the nutritional needs of patients in hospitals, nursing homes, or clinics. Among their duties, clinical dietitians confer with doctors and other members of the health care team about the patients' nutritional care, instruct patients and their families on the requirements and importance of their diets, and suggest ways to help them stay on these diets after leaving the hospital or clinic. In a small institution, one person may be both

the administrative and clinical dietitian.

Research dietitians evaluate and interpret research findings to improve the nutrition of people in health and in disease. This research may be in nutrition science and education, food management, food service systems and equipment. They conduct studies and make surveys of food intake, food acceptance, and food utilization in the body for individuals and groups of people. Research projects may relate to subjects such as nutritional needs of the aging, persons with a chronic disease, or space travelers.

Dietetic educators teach normal nutrition and nutrition in disease to dietetic, medical, dental, and nursing students and to interns, residents, and other members of the health care team. This may be



A therapeutic dietitian instructing a patient about his diet.

in hospitals, clinics, and schools.

Nutritionists counsel people of all ages, as individuals or in groups on sound nutrition practices, to maintain and improve health. This includes food budgeting and purchasing, and meal planning and preparation. Nutritionists in the public health field are responsible for planning, developing, administering, and coordinating nutrition programs and services as part of public health programs.

An increasing number of dietitians work as consultants to hospitals and to health-related facilities. Others act as consultants to commercial enterprises, including food processors, equipment manufacturers, and utility companies.

Places of Employment

About 33,000 persons, most of them women, worked as dietitians in 1972. More than two-fifths work in hospitals and clinics, including about 1,000 in the Veterans Administration and the U.S. Public Health Service. Colleges, universities, and school systems employ a large number of dietitians as teachers or as dietitians in food service systems. Most of the rest work for public health agencies, restaurants, or cafeterias and large companies that provide food service for their employees. Some dietitians are commissioned officers in the Armed Forces.

Training, Other Qualifications, and Advancement

A bachelor's degree, preferably with a major in foods and nutrition or institution management, is the basic educational requirement for dietitians. This degree can be earned in more than 250 colleges and universities, usually in departments of home economics. College

courses usually required are in food and nutrition, institution management, chemistry, bacteriology, physiology, and related courses such as mathematics, data processing, psychology, sociology, and economics.

For a dietitian to qualify for professional recognition, the American Dietetic Association recommends the completion after graduation of an approved dietetic internship or 2 years experience. In 1972, 75 internship programs were approved by the American Dietetic Association. A growing number of coordinated undergraduate programs, located in schools of medicine and in allied health and home economics departments of both colleges and universities, enable students to complete both the requirements for a bachelor's degree and the clinical experience requirement in four years.

Experienced dietitians may advance to assistant director or director of a dietetic department in a large hospital or other institution. Advancement to higher level positions in teaching and research usually requires graduate education; public health nutritionists must earn a graduate degree in this field. Graduate study in institutional or business administration is valuable to those interested in administrative dietetics.

Persons who plan to become dietitians should have organizational and administrative ability, as well as high scientific aptitude, and should be able to work well with a variety of people.

Employment Outlook

Employment opportunities for qualified dietitians on both a full-time and part-time basis are expected to be good through the mid-1980's. In recent years, dietetic assistants trained in vocational and

employers to help meet demands for dietetic services. Since this situation is likely to persist, employment opportunities also should continue to be favorable for graduates of these programs.

Employment of dietitians is expected to grow rapidly to meet the nutrition and food management needs of hospitals and extended care facilities, schools, industrial plants, and restaurants. Dietitians also will be needed to staff community health programs and to conduct research in food and nutrition. In addition to new dietitians needed because of occupational growth, many others will be required each year to replace those who die, retire, or leave the profession for marriage and family responsibilities.

The number of men dietitians is growing. Men are likely to find increasing employment opportunities, especially as administrative dietitians in college and university food services, hospitals, and commercial eating places.

Earnings and Working Conditions

Starting salaries of hospital dietitians averaged \$8,800 a year in 1972, according to a national survey conducted by the University of Texas Medical Branch. Experienced dietitians received annual salaries ranging from \$8,400 to \$14,700. Colleges and universities paid dietitians with bachelor's degrees average salaries of \$10,700 a year in 1972, according to the American Dietetic Association. Dietitians who worked in commercial or industrial establishments averaged about \$12,300; those in public and voluntary health agencies, \$10,800. Self-employed dietitians with a bachelor's degree earned over \$14,000 a year, in 1972; some, with Ph.D.'s, averaged as much as

technical schools and dietetic technicians trained in junior colleges have increasingly been utilized by \$21,000 yearly.

The entrance salary in the Federal Government for those completing an approved internship was \$9,500 in early 1973. Beginning dietitians with a master's degree who had completed an internship earned \$11,600. Nutrition consultants working in State and local governments averaged salaries of \$9,900 to \$12,800 in 1972.

Most dietitians work 40 hours a week; however, dietitians in hospitals may sometimes work on weekends, and those in commercial food service have somewhat irregular hours. Some hospitals provide laundry service and meals in addition to salary. Dietitians usually receive paid vacations, holidays, and health insurance and retirement benefits.

Sources of Additional Information

For information on approved dietetic internship programs, scholarships, and employment opportunities, and a list of colleges providing training for a professional career in dietetics, contact:

The American Dietetic Association, 620 North Michigan Ave., Chicago, Ill. 60611.

The U.S. Civil Service Commission, Washington, D.C. 20415, will send information on the requirements for dietetic interns and dietitians in Federal Government hospitals.

HOSPITAL ADMINISTRATORS

(D.O.T. 187.118)

Nature of the Work

Hospital administrators hold the highest executive positions in hospitals and manage all administrative activities. They usually receive general guidance from a hospital governing board in developing plans and policies.

Administrators direct and coordinate the varied activities of the hospital, and are responsible for the personnel, equipment, finances, building, and services provided by the hospital. Administrators work closely with the

medical and nursing staffs to determine the needs for additional personnel and equipment. They also plan, with the help of their business staff, for current and future space needs, purchase of supplies and equipment, and provision of patients' services such as mail and laundry. The preparation and administration of the budget are important responsibilities of the administrator. With the help of a hospital engineer, the administrator is responsible for insuring that the buildings and equipment are properly maintained.

In small hospitals, administrators assume all management duties. In large hospitals they are assisted by specialists trained either in hospital



administration or in specialized managerial skills such as purchasing, public relations, or labor relations.

Under the direction of the governing board, administrators may carry out large projects to expand or develop the hospital's services, such as organizing fund-raising campaigns or planning new medical care, research, or educational programs.

Administrators meet regularly with their staff to discuss progress, make plans, and solve problems concerning the operations of the hospitals. Working with the medical staff and department heads, they may develop and maintain teaching programs for nurses, interns, and other hospital staff members as well as cooperative educational programs in allied health with colleges and universities. Administrators also may address community gatherings, organize community health campaigns, and participate in planning community health care programs.

Places of Employment

About 17,000 persons worked as hospital administrators and assistants in 1972. About two-thirds worked in nonprofit or private hospitals. The remainder worked in Federal, State, and local government hospitals. Of those employed by the Federal Government, most worked in Veterans Administration, Armed Forces, and Public Health Service hospitals.

About 15 percent of all administrators and their assistants are women; many are members of religious orders.

Hospital administrators are located in cities and towns throughout the country, but most are in large population centers.

Training, Other Qualifications, and Advancement

Educational requirements for hospital administrators vary. Most hospitals prefer applicants having at least a master's degree in health and hospital administration from an accredited graduate program. Some prefer formal training in social or behavioral sciences, industrial engineering, or business administration, along with extensive experience in the health field. A few require their administrators to be physicians or registered professional nurses. Specialized hospitals (such as mental or orthopedic hospitals) may prefer physicians whose medical specialty is the same as that of the hospital. Hospitals run by religious groups may seek administrators of the same faith.

In 1972, 38 colleges and universities offered master's degree programs in health and hospital administration. The programs generally last 2 years, but vary in time allocated to academic study and to supervised administrative experience in hospitals or health agencies. The minimum amount of required academic study is about a year; supervised administrative experience requirements range up to a year.

The curriculum may include courses such as hospital organization and management, medical care, accounting and budget control, personnel administration, public health administration, and the economics of health care. The chief administrator of the affiliated hospital or his assistant supervise students as they gain experience in all phases of hospital administration. A Ph.D. in health administration, offered in several universities, is especially helpful for those who want to teach and do research.

The American College of Hospital Administrators provides fi-

nancial loans and scholarships to a limited number of students for graduate work in health and hospital administration. Some Federal Government awards for graduate training in health and hospital administration also are available.

A growing number of colleges and universities offer bachelor's degree programs in health administration. These prepare students for middle management positions in hospitals or other health care institutions such as nursing homes or community health centers. Some community colleges offer an associate degree in health administration which prepares students for assistant administrative positions in smaller health care institutions.

New graduates having a master's degree in health and hospital administration usually enter the field as assistant administrators or department heads and occasionally as administrators in small hospitals. Some persons who do not have a master's degree in health and hospital administration enter the field by working in one of the specialized administrative areas such as personnel, records, budget and finance, or data processing. With this experience and some graduate work, they may be promoted to department head, to assistant administrator, and eventually some become a chief administrator.

Personal qualifications needed for success as a hospital administrator include initiative and interest in community service. Administrators should be able to work with and inspire people, organize and direct large-scale activities. They also must be good public speakers.

Employment Outlook

Employment opportunities for new graduates having the master's

degree in hospital administration are expected to be favorable through the mid-1980's. Applicants who do not have graduate education will find it increasingly difficult to enter this field in upper management positions in hospitals and other health programs. A few positions for administrators are likely to continue to be filled by physicians, persons in other professional medical occupations, or persons experienced in a specialized administrative area.

The number of positions in hospital administration is expected to grow very rapidly through the mid-1980's, as health facilities are expanded to provide additional health services to an increasing population. A trend towards more complex organization in hospitals also is expected to create new openings for administrative assistants. However, the number of master's programs in health and hospital administration also has grown very rapidly since the mid-1960's. If these trends continue through the 1970's, the number of graduates can be expected to be adequate to meet the growth in the occupation.

The position of hospital administrator, especially in a large hospital, is a career goal which is attained by only a few of the graduates of a master's degree program in hospital administration, and is generally filled by promotion from within the hospital. However, there are a growing number of administrative positions available to these graduates in other health care institutions such as large nursing or personal care homes and in public health departments. Still other positions will be open to them in voluntary health organizations which are State or nationwide in scope.

Earnings and Working Conditions

Salaries of hospital administrators depend on factors such as size, type, and location of the hospital, and size of its administrative staff and budget. Administrative assistants in hospitals earned an average starting salary of \$9,780 in 1972, according to a national survey conducted by the University of Texas Medical School at Galveston. Experienced administrative assistants in very large hospitals earned up to \$18,000 or more.

Average salaries of chief hospital administrators ranged between \$21,000 and \$25,000 in 1972, according to a survey conducted for the American College of Hospital Administrators. Many earned over \$40,000.

Salaries of experienced VA hospital administrators, many of them physicians, ranged from \$31,203 to \$36,000 in early 1973.

Commissioned officers in the Armed Forces who work as hospital administrators hold ranks ranging from second lieutenant to colonel or from ensign to captain. Commanding officers of large Armed Forces hospitals are usually physicians who may hold higher ranks. Hospital administrators in the U.S. Public Health Service are commissioned officers, holding ranks ranging from lieutenant (junior grade) to captain in the Navy.

Hospital administrators often work long hours. Since hospitals operate on a round-the-clock basis, the administrator may be called on to settle emergency problems at any time of the day or night. He also may be called on to attend meetings held at various locations outside the hospital.

Source of Additional Information

Information about hospital administration and a list of colleges and universities offering this training are available from:

American College of Hospital Administrators, 840 North Lake Shore Dr., Chicago, Ill. 60611.

Association of University Programs in Health Administration, One Dupont Circle NW., Washington, D.C. 20036.

For information on Federal Government awards for graduate training in hospital administration, contact the financial aid office of the individual universities, or:

Bureau of Health Manpower Education, National Institutes of Health, Bethesda, Md. 20014.

MEDICAL LABORATORY WORKERS

(D.O.T. 078.128, .168, .281, and .381)

Nature of the Work

Laboratory tests play an important part in the detection, diagnosis, and treatment of many diseases. Medical laboratory workers, often called clinical laboratory workers, include three levels: medical technologists, technicians, and assistants. They perform tests under the direction of pathologists (physicians who diagnose the causes and nature of disease), and other physicians, or scientists who specialize in clinical chemistry, microbiology, or the other biological sciences. Medical laboratory workers analyze the blood, tissues, and fluids in the human body by using precision instruments, such as microscopes and automatic analyzers.

Medical technologists, who require 4 years of post-secondary

training, perform complicated chemical, microscopic, and bacteriological tests. These tests may include chemical tests to determine, for example, blood cholesterol level, or microscopic examination of the blood to detect the presence of diseases such as leukemia. They microscopically examine other body fluids; make cultures of body fluid or tissue samples to determine the presence of bacteria, parasites, or other micro-organisms; and analyze them for chemical content or reaction. Technologists also may type and cross-match blood samples.

Technologists in small laboratories often perform many types of tests. Those in large laboratories usually specialize in areas such as microbiology, parasitology, biochemistry, blood banking, hematology (the study of blood cells), and nuclear medical technology (the use of radioactive isotopes to help detect diseases).

Most medical technologists conduct tests related to the examination and treatment of patients. However, some do research on new drugs or on the improvement of laboratory techniques. Others teach or perform administrative duties.

Medical laboratory technicians, who generally require 2 years of post-secondary training, perform a wide range of tests and laboratory procedures that require a high level of skill but not the technical knowledge of the highly-trained technologists. Like technologists, they may work in several areas or specialize in one field.

Medical laboratory assistants, who generally have a year or less of formal training, assist medical technologists in routine tests and related work that can be learned in a relatively short time. In large laboratories, they may concentrate in one of several areas. For example, they may identify slides with abnormal blood cells. In addition

to performing routine tests, assistants may store and label plasma; clean and sterilize laboratory equipment, glassware, and instruments; prepare solutions following standard laboratory formulas and procedures; keep records of tests; and identify specimens.

Places of Employment

About 165,000 people worked as medical laboratory workers in 1972. About 80 percent of all medical laboratory workers were women; however, the number of men in the field has been increasing in recent years.

Most medical laboratory personnel work in hospitals. Others work in independent laboratories, physicians' offices, clinics, public health agencies, pharmaceutical firms, and research institutions. These places are concentrated in larger cities and populous States.

In 1972, Veterans Administration hospitals and laboratories employed



Medical laboratory assistant prepares to scan blood smear to identify red and white blood cells.

about 1,600 medical technologists and about 1,900 medical laboratory technicians and assistants. Others worked for the Armed Forces and the U.S. Public Health Service.

Training, Other Qualifications, and Advancement

The minimum educational requirement for a beginning job as a medical technologist usually is 4 years of college training including completion of a specialized training program in medical technology.

Undergraduate work includes courses in chemistry, biological science, and mathematics. These studies give the technologist a broad understanding of the scientific principles underlying laboratory work. Specialized training usually requires 12 months of study and includes extensive laboratory work. In 1972, about 750 hospitals and schools offered programs approved by the American Medical Association. These programs were affiliated with colleges and universities and a bachelor's degree is usually awarded upon completion. A few schools require a bachelor's degree for entry into the program.

Many universities also offer advanced degrees in medical technology and related subjects for technologists who plan to specialize in laboratory work or in teaching, administration, or research.

Medical laboratory technicians employed in 1972 got their training in a variety of educational settings. Many attended junior or 4-year colleges and universities for one or more years. Others were trained in the Armed Forces. Some technicians received training in private and nonprofit vocational and technical schools.

Most medical laboratory assistants employed in 1972 were trained on the job. In recent years, however, an increasing number have studied in one-year training programs conducted by hospitals, junior colleges in cooperation with hospitals, or vocational schools. Hospitals offer the greatest number of training programs. Applicants to these programs should be high

school graduates with courses in science and mathematics. The programs include classroom instruction and practical training in the laboratory. They often begin with a general orientation to the clinical laboratory followed by courses in bacteriology, serology, parasitology, hematology, clinical chemistry, blood banking, and urinalysis.

Certification or registration is considered important in this field because it indicates that the persons certified have met educational standards recognized by the certifying body. After the successful completion of the appropriate examinations, medical technologists may be certified as Medical Technologists, MT (ASCP), by the board of Registry of the American Society of Clinical Pathologists; Medical Technologists, MT, by the American Medical Technologists; or Registered Medical Technologists, RMT, by the International Society of Clinical Laboratory Technologists. These organizations also certify technician-level workers. Laboratory assistants are certified by the American Society of Clinical Pathologists.

Medical technologists and/or technicians must be licensed in Alabama, California, Florida, Georgia, Hawaii, Illinois, Nevada, Pennsylvania, Tennessee, New York City, and Puerto Rico. Requirements for licensure include a written examination in some States.

Accuracy, dependability, and the ability to work under pressure are important personal characteristics for a medical laboratory worker. Manual dexterity and accurate color vision are highly desirable.

Young people interested in medical laboratory careers should use considerable care in selecting a training program. They should get information about the kinds of jobs obtained by graduates, educational

costs, the accreditation of the school, the length of time the training program has been in operation, instructional facilities, and faculty qualifications.

Technologists may advance to supervisory positions in certain areas of laboratory work, or, after several years' experience, to chief medical technologist in a large hospital. Graduate education in one of the biological sciences or chemistry usually speeds advancement. Technicians can advance to technologists by getting necessary additional education and experience.

Employment Outlook

Employment of medical laboratory workers is expected to expand moderately through the mid-1980's, as physicians make wider use of laboratory tests in routine physical checkups and in the diagnosis and treatment of disease. Indirectly influencing growth in the field are population growth, rising standards of living, greater health consciousness, and expansion of prepayment programs for medical care that make it easier for people to pay for services.

While employment of laboratory personnel in general is expected to expand moderately, the use of automated laboratory test equipment may lead to a greater growth of medical laboratory technicians and assistants relative to technologists. Through technological advances, technicians and assistants can operate equipment to perform tests which previously required the skill of a technologist.

Technologists will be needed to fill supervisory positions in all laboratories. Also, some will be needed in laboratories where they are required by State licensing requirements or third party health

insurance regulations, and in laboratories not using the new automated equipment.

In addition to medical laboratory workers who will be needed to fill openings resulting from expansion in the field, thousands of workers will be needed annually to replace those who die, retire, or leave their jobs for other reasons.

Earnings and Working Conditions

Salaries of medical laboratory workers vary by employer and geographic location. In general, medical laboratory workers employed on the West Coast and in large cities received the highest salaries.

Starting salaries for medical technologists in hospitals and medical schools averaged about \$8,300 in 1972, according to a survey conducted by the University of Texas Medical Branch. Beginning salaries for laboratory assistants averaged about \$6,200. Technicians earn salaries that range between those paid technologists and assistants.

The Federal Government paid newly graduated medical technologists with bachelor's degrees starting salaries of \$7,694 a year in early 1973. Those having experience, superior academic achievement, or a year of graduate study entered at \$9,520. The Federal Government paid medical laboratory assistants and technicians starting salaries ranging from \$4,798 to \$6,128 a year in early 1973, depending on the amount and type of education and experience.

Medical laboratory personnel generally work a 40-hour week. In hospitals, they can expect some night or weekend duty. Hospitals normally provide vacation and sick leave benefits; some have retirement plans.

Laboratories generally are well-

lighted and clean. Although unpleasant odors and specimens of many kinds of diseased tissue often are present, few hazards exist if proper methods of sterilization and handling of specimens, materials, and equipment are used.

Sources of Additional Information

Information about education and training for medical technologists, technicians, and laboratory assistants meeting standards recognized by the medical profession and/or the U.S. Office of Education, as well as career information on these fields of work is available from:

Board of Registry of the American Society of Clinical Pathologists, Box 4872, Chicago, Ill. 60680.

American Society for Medical Technologists, 555 West Loop South, Houston, Tex. 77401.

The Accrediting Bureau of Medical Laboratory Schools of the American Medical Technologists, 710 Higgins Rd., Park Ridge, Ill. 60068.

For information about other technician training programs, contact:

International Society of Clinical Laboratory Technologists, 805 Ambassador Building, 411 North Seventh St., St. Louis, Mo. 63101.

Information about employment opportunities in government clinical and research hospitals is available from the Department of Medicine and Surgery, Veterans Administration, Washington, D.C. 20421, and the Clinical Center, National Institutes of Health, Bethesda, Maryland 20014.

MEDICAL RECORD ADMINISTRATORS

(D.O.T. 100.388)

Nature of the Work

All health care institutions keep records that contain medical information on each patient, including case histories of illnesses or injuries, reports on physical examinations, X-rays and laboratory tests, doctors' orders and notes, and nurses' notes. These records are necessary for correct and prompt diagnosis and treatment of illnesses and injuries. They also are used for research, insurance claims, legal actions, evaluation of treatment and medications prescribed, and in the training of medical personnel. Medical information in hospital records also is used to evaluate the effectiveness of a hospital's care, and to plan programs at community health centers.

Medical record administrators, also known as medical record librarians, direct the activities of the medical record department and develop systems for documenting, storing, and retrieving medical information. They supervise the work of the medical record staff in the preparation and analysis of records and reports on patients' illnesses and treatment. Among their main duties are training members of the medical record staff for specialized jobs, compiling medical statistics required by State or national health agencies, and assisting medical staff members in evaluation of patient care and in scientific studies. Medical record administrators represent their departments at hospital staff meetings, and may be called to testify in court about information contained in a medical record.

The size and type of institution employing medical record admin-

istrators affects the duties and amount of responsibility assigned to these workers. In large hospitals, chief medical record administrators supervise other medical record administrators, technicians, and clerks. Smaller hospitals may employ only two or three persons in the medical record departments and in nursing homes usually one person keeps the medical records. In these cases, the medical record administrator performs technical and clerical as well as professional duties.

Places of Employment

Most of the 11,600 medical record administrators employed in 1972 worked in hospitals. The remainder worked in clinics, nursing homes, State and local public health departments, and medical research centers. Some health insurance companies also employ medical record administrators to help determine liability for payment of their clients' medical fees.



Medical record administrator obtains information from a patient's record with the help of a technician on her staff.

Some medical record administrators work for firms that manufacture equipment for recording and processing medical data and develop and print health insurance and medical forms. Many small health care facilities hire medical record administrators as consultants. Although most medical record administrators are women, the number of men in the occupation is growing.

Training, Other Qualifications, and Advancement

Preparation for a career as a medical record administrator is offered in specialized programs in colleges, universities, and hospitals. Most programs last 4 years and lead to a bachelor's degree in medical record administration. However, concentration in medical record administration begins in the third or fourth year of study, making transfer from a junior college possible. One-year certificate programs also are available for those who already have a bachelor's degree and required courses in the liberal arts and biological sciences. In 1972, there were 31 programs in medical record administration approved by the Council on Medical Education of the American Medical Association and the American Medical Record Association (AMRA).

Training for medical record administrators includes both classroom instruction and experience in hospital medical record departments. Anatomy, physiology, fundamentals of medical science, medical terminology, and medical record science are among the required scientific courses. In addition, management courses such as hospital organization and administration, health law, statistics, and

data processing are part of the curriculum. Experience in the medical record departments of hospitals provides students with a practical background in applying standardized medical record practices, compiling statistical reports, analyzing data from the medical records, and organizing medical record systems.

Graduates of approved schools in medical record administration are eligible for the national registration examination given by AMRA. Passing this examination gives professional recognition as a Registered Record Administrator (RRA). There were about 4,750 employed RRA's in 1972, according to AMRA.

Medical record administrators must be accurate and interested in detail. They also must be able to communicate clearly in speech and writing. Because medical records are confidential, medical record administrators must be discreet in processing and releasing information. Supervisors must be able to organize and analyze work procedures and to work effectively with other hospital personnel.

Medical record administrators with some experience in smaller health facilities may advance to positions as department heads in large hospitals or to higher level positions in hospital administration. Some coordinate the medical record departments of several small hospitals. Others move on to medical record positions in health agencies. Many teach in the expanding programs for medical record personnel in 2- and 4-year colleges and universities.

Employment Outlook

Employment opportunities for graduates of approved medical record administrator programs are expected to be excellent through

the mid-1980's. Employment is expected to grow very rapidly, with the increasing use of hospitals and other health facilities as more and more people are covered by health insurance. The detailed information required by third-party payers such as insurance companies and Medicare also will cause some growth in the occupation. More consultants will be needed to standardize health records in nursing homes and home care programs. The importance of medical records in research, and the growing use of computers to store and retrieve medical information also should increase the demand for qualified medical record administrators to develop new medical information systems. Part-time employment opportunities also should be available in teaching, in research, and as consultants to health care facilities.

Earnings and Working Conditions

The salaries of medical record administrators are influenced by the location, size, and type of employing institution, as well as by the duties and responsibilities of the position. The average starting salary for medical record administrators in 1972 was \$8,760 a year, according to a national survey conducted by the University of Texas Medical Branch at Galveston. Top salaries averaged \$10,500 a year, with some earnings as much as \$16,000.

Newly graduated medical record administrators employed by the Federal Government generally started at \$7,700 a year in early 1973; those having bachelor's degrees and good academic records were eligible to begin at \$9,500. Some experienced medical record administrators employed by the Federal

Government earned as much as \$16,700 annually.

Medical record administrators usually work a regular 40-hour week and receive paid holidays and vacations.

Sources of Additional Information

Information about approved schools and employment opportunities is available from:

The American Medical Record Association, 875 North Michigan Ave., Suite 1850, John Hancock Center, Chicago, Ill. 60611.

OCCUPATIONAL THERAPISTS

(D.O.T. 079.128)

Nature of the Work

Occupational therapists plan and direct educational, vocational, and recreational activities designed to help mentally and physically disabled patients become self-sufficient. They evaluate the capacities and skills of patients and plan a therapy program with other members of a medical team which may include physicians, physical therapists, vocational counselors, nurses, social workers, and other specialists.

About 1 therapist out of 3 works with emotionally handicapped patients, and the rest work with physically disabled persons. These patients represent all age groups and degrees of illness. Patients participate in occupational therapy to determine the extent of abilities and limitations; to regain physical, mental, or emotional stability; to relearn daily routines such as eating, dressing, writing, and using a telephone; and

eventually, to prepare for employment.

Occupational therapists teach manual and creative skills such as weaving and leather working, and business and industrial skills such as typing and the use of power tools. They also plan and direct activities especially for children. Therapists may design and make special equipment or splints to help disabled patients.

Besides working with patients, occupational therapists supervise student therapists, occupational therapy assistants, volunteers, and auxiliary nursing workers. The chief occupational therapists in hospitals may teach medical and nursing students the principles of occupational therapy. Many therapists administer occupational therapy programs, coordinate patient activities, or are consultants to local and State health departments and mental health agencies. Some teach in colleges and universities.



Places of Employment

About 7,500 people, more than 9 out of 10 of them women, worked

as occupational therapists in 1972. More than three-fourths of all occupational therapists work in hospitals. Rehabilitation centers, nursing homes, schools, outpatient clinics, community mental health centers, and research centers employ most of the others. Some work in special sanitariums or camps for handicapped children, others in State health departments. Still others work in home-care programs for patients unable to attend clinics or workshops. Some are members of the Armed Forces.

Training, Other Qualifications, and Advancement

A degree or certificate in occupational therapy is required to enter the profession. In 1972, 40 colleges and universities offered programs in occupational therapy which were accredited by the American Medical Association and the American Occupational Therapy Association. All but one of these schools offer bachelor's degree programs. Some schools have 2 year programs and accept students who have completed 2 years of college. Some also offer shorter programs, leading to a certificate or a master's degree in occupational therapy for students who have a bachelor's degree in another field. One school offers the master's degree only. A graduate degree often is required for teaching, research, or administrative work.

Course work in occupational therapy programs includes physical, biological, and behavioral sciences and the application of occupational therapy skills. Students also work in hospitals or health agencies to gain clinical experience. After students complete the 6 to 9 month clinical practice period and graduate from their programs, they are eligible for the American Occupational Therapy Association examination to become registered occupational therapists (O.T.R.).

Occupational therapy assistants who are certified by the association and have 2 years of approved work experience also are eligible to take the examination to become registered occupational therapists.

Personal qualifications needed in this profession include emotional stability and a sympathetic but objective approach to illness and disability. Occupational therapists also need ingenuity, imagination, and the ability to teach.

Newly graduated occupational therapists generally begin as staff therapists. After several years on the job, they may qualify as senior therapists or specialized practitioners. Some advance to supervisory or administrative jobs in occupational therapy programs; a few teach or do research.

Employment Outlook

Employment opportunities for occupational therapists are expected to be favorable through the mid-1980's. The increasing number of graduates is expected to be roughly in balance with new openings that are expected to result from growth of the occupation and replacement for those who will die, retire, or leave the occupation for other reasons.

Public interest in the rehabilitation of disabled persons and the success of established occupational therapy programs are expected to create very rapid growth in the employment of occupational therapists. Many therapists will be needed to staff community health centers and extended care facilities and to work with psychiatric patients, children with cerebral palsy, and elderly persons with heart disease.

Earnings and Working Conditions

Beginning salaries for new gradu-

ates of occupational therapy programs averaged about \$8,500 a year in 1972, according to a national survey conducted by the University of Texas Medical School at Galveston. Experienced occupational therapists earned an average salary of about \$10,200 a year; some earned as much as \$13,000.

In early 1973, beginning therapists employed by the Veterans Administration earned starting salaries of \$8,572 a year. Most experienced, nonsupervisory occupational therapists earned about \$11,600 annually.

Many part-time positions are available for occupational therapists. Some organizations require evening work.

Sources of Additional Information

For more information on occupational therapy as a career write to:

American Occupational Therapy Association, 6000 Executive Blvd., Rockville, Md. 20852.

PHARMACISTS

(D.O.T. 074.181)

Nature of the Work

Pharmacists dispense drugs and medicines prescribed by medical practitioners and supply and advise people on the use of many medicines that can be obtained with and without prescriptions. Pharmacists must understand the use, composition, and effect of drugs and be able to test them for purity and strength. They also advise physicians on the proper selection and use of medicines. Compounding—the ac-

tual mixing of ingredients to form powders, tablets, capsules, ointments, and solutions—is now only a small part of pharmacists' practice, since most medicines are produced by manufacturers in the form used by the patient.

Many pharmacists employed in community pharmacies also have other duties. Besides dispensing medicines, some pharmacists buy and sell nonpharmaceutical merchandise, hire and supervise personnel, and oversee the general operation of the pharmacy. Other pharmacists, however, operate prescription pharmacies that dispense only medicines, medical supplies, and health accessories.

Pharmacists in hospitals and clinics dispense prescriptions and advise the medical staff on the selection and effects of drugs; they also make sterile solutions, buy medical supplies, teach in schools of nursing and allied health professions, and perform administrative duties. An increasing number of hospital pharmacists work in patient care areas as consultants to the medical team.

Some pharmacists, employed as medical sales representatives by drug manufacturers and wholesalers, sell medicines to retail pharmacies and to hospitals, and inform health personnel about new drugs. Others teach in pharmacy colleges, supervise the manufacture of pharmaceuticals, or develop new medicines. Some pharmacists also edit or write articles for pharmaceutical journals, or do administrative work.

Places of Employment

Nearly 131,000 persons worked as licensed pharmacists in 1972; nearly 10 percent were women. About 107,000 pharmacists worked in community pharmacies. Of these community pharmacists, more than two-fifths owned their own phar-



Pharmacist at poison control center giving emergency instructions for treatment.

macies; the others were salaried employees. Most of the remaining salaried pharmacists worked for hospitals, pharmaceutical manufacturers, and wholesalers. Some were civilian employees of the Federal Government, working chiefly in hospitals and clinics of the Veterans Administration and the U.S. Public Health Service. Others served as pharmacists in the Armed Forces, taught in colleges of pharmacy, or worked for State and local government agencies.

Most towns have at least one pharmacy with one or more pharmacists in attendance. Most pharmacists, however, practice in or near cities, and in those States which have the largest populations.

Training, Other Qualifications, and Advancement

A license to practice pharmacy is required in all States and the District of Columbia. To obtain a license, one must be a graduate of an accredited pharmacy college, pass a State board examination and—in nearly all States—have a specified amount of practical experience or internship under the supervision of a registered pharmacist. All States except California, Florida, and Hawaii grant a license without examination to qualified

pharmacists already licensed by another State.

At least 5 years of study beyond high school are required to graduate from one of the 73 accredited colleges of pharmacy and receive a Bachelor of Science (B.S.) or a Bachelor of Pharmacy (B. Pharm.) degree. A few colleges that require 6 years award a Doctor of Pharmacy (Pharm. D.) degree at the completion of the program. A few colleges admit students directly from high school and offer all the education necessary for graduation. Most colleges provide 3 or 4 years of professional instruction and require all entrants to have completed their prepharmacy education in an accredited junior college, college, or university.

A prepharmacy curriculum usually emphasizes mathematics and basic sciences, such as chemistry and biology, but also includes courses in the humanities and social sciences. Because entry requirements vary among colleges of pharmacy, prepharmacy students should inquire about and follow the curriculum required by colleges they plan to attend.

The bachelor's degree in pharmacy is the minimum educational qualification for most positions in the profession. However, a master's or doctor's degree in pharmacy or a related field usually is required for research work or college teaching. Areas of special study include pharmaceutics, pharmaceutical chemistry, pharmacology (study of the effects of drugs on the body), pharmacognosy (study of the drugs derived from plant or animal sources), clinical pharmacy, and pharmacy administration.

Needy students may obtain Federal loans or scholarships up to \$3,500 a year to pursue full-time study leading to a degree in phar-

macy. Several scholarships are awarded annually by drug manufacturers, chain drug stores, corporations, State and national pharmacy associations, and the colleges of pharmacy.

Since many pharmacists are self-employed, prospective pharmacists should have some business ability, as well as an interest in medical science and the ability to instill confidence in patients. Honesty, integrity, and orderliness are important attributes for the profession. In addition, accuracy is needed to compound and dispense medicines, as well as keep records required by law.

Pharmacists often begin as employees in community pharmacies. After they gain experience and obtain the necessary funds, they may become owners or part-owners of pharmacies. A pharmacist who gains experience in a chain drugstore may advance to managerial positions, and later to a higher executive position within the company. Hospital pharmacists who have the necessary training and experience may advance to director of pharmacy service or to other administrative positions.

Employment Outlook

The employment outlook for pharmacists is expected to be very good through the mid-1980's. Since growth of the occupation is expected to be moderate, most of the openings will result from the death and retirement of persons already in the profession. Overall, job openings are expected to exceed in number the graduates of pharmacy schools.

Employment in the occupation will grow as new pharmacies are established, particularly in residential areas or suburban shopping centers. Many community phar-

macies, also, are expected to hire additional pharmacists, because of a trend towards shorter working hours. Population growth, the rising standard of medical care, and the growth of Medicaid and other insurance programs that provide payment for prescription drugs also will generate demand for pharmacists.

Employment in hospitals probably will rise with the more extensive use of pharmacists for hospital and clinic work. Continued expansion in the manufacture of pharmaceutical products and in research are expected to provide more opportunities for pharmacists in production, research, distribution, and sales. Pharmacists with advanced training will be needed for college teaching and laboratory research.

Earnings and Working Conditions

Earnings of pharmacists employed in chain drug stores averaged about \$14,700 in 1972, according to a survey conducted by the National Association of Chain Drug Stores. Pharmacists who are owners or managers of pharmacies often earn more. The entrance salary in the Federal Civil Service for new graduates was about \$11,600 a year, in early 1973. With a master's degree or 2 years of graduate studies, the beginning salary was about \$14,000.

Annual starting salaries for hospital pharmacists were about \$11,100 in 1972, according to a survey conducted by the University of Texas Medical School at Galveston. Top salaries for experienced hospital pharmacists averaged \$13,500, and some were as high as \$17,500.

Community pharmacists generally work more than the standard 40-hour workweek. Pharmacies often are open in the evenings and on weekends, and all States require a registered pharmacist to be in

attendance during store hours. Despite the general trend toward shorter hours, 44 hours is still the basic workweek for many salaried pharmacists, and some work 50 hours or more. Self-employed pharmacists often work more hours than those in salaried positions. Those who teach or work for industry, government agencies, or hospitals have shorter workweeks.

Sources of Additional Information

A free packet giving information on pharmacy as a career, preprofessional requirements, and student financial aid is available from:

American Association of Colleges of Pharmacy, Office of Student Affairs, 8121 Georgia Ave., Suite 800, Silver Spring, Md. 20910.

General information on pharmacy is available from:

American Pharmaceutical Association, 2215 Constitution Ave. NW., Washington, D.C. 20037.

Information about chain drug stores is available from:

National Association of Chain Drug Stores, 1911 Jefferson Highway, Arlington, Va. 22202.

For information about retail pharmacies, contact:

National Association of Retail Drug-gists, One East Wacker Dr., Chicago, Ill. 60601.

A list of accredited colleges is available from:

American Council on Pharmaceutical Education, 77 West Washington St., Chicago, Ill. 60602.

Information on requirements for licensure in a particular State is available from the Board of Pharmacy of that State or from:

National Association of Boards of Pharmacy, 77 West Washington St., Chicago, Ill. 60602.

Information on college entrance requirements, curriculums, and financial aid is available from the dean of any college of pharmacy.

PHYSICAL THERAPISTS

(D.O.T. 079.378)

Nature of the Work

Physical therapists help persons with muscle, nerve, joint, and bone diseases or injuries to overcome their resulting disabilities. Their patients include accident victims, crippled children, and disabled older persons. Physical therapists perform and interpret tests and measurements for muscle strength, motor development, functional capacity, and respiratory and circulatory efficiency to develop programs for treatment. They evaluate the effectiveness of the treatment and discuss the patients' progress with physicians, psychologists, occupational therapists, and other specialists. When advisable, physical therapists revise the therapeutic procedures and treatments. They help disabled persons to accept their physical handicaps and adjust to them. They show members of the patients' families how to continue treatments at home.

Therapeutic procedures include exercises for increasing strength, endurance, coordination, and range of motion; stimuli to make motor activity and learning easier; instruction in carrying out everyday activities and in the use of helping devices; and the application of massage, heat and cold, light, water, or electricity to relieve pain or improve the condition of muscles.

Most physical therapists provide direct care to patients as staff members, supervisors, or self-employed practitioners. These therapists either may treat many categories or patients or else may specialize in pediatrics, geriatrics, amputations, arthritis, or paralysis. Others administer physical therapy programs, teach, or are consultants.



Places of Employment

About 18,000 persons—3 out of 4 of them women—worked as licensed physical therapists in 1972. About three-fourths of all physical therapists work in hospitals or nursing homes; others, in rehabilitation centers or schools for crippled children. Some who work for public health agencies treat chronically sick patients in their own homes. Still others work in physicians' offices or clinics, teach in schools of physical therapy, or work for research organizations. A few serve as consultants in government and voluntary agencies or are members of the Armed Forces.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require a license to practice physical therapy. Applicants for a license must have a degree or certificate from a school of physical therapy and to qualify must pass a State board examination. In 1972, 59 schools of physical therapy were approved by the American Medical

Association and the American Physical Therapy Association.

Most of the approved schools of physical therapy offer bachelor's degree programs. Some schools provide 1- to 2-year programs for students who have completed some college courses. Other schools accept those who already have a bachelor's degree and give a 12- to 16-month course leading to a certificate in physical therapy. Many schools offer both degree and certificate programs.

The physical therapy curriculum includes science courses such as anatomy, physiology, neuroanatomy, and neurophysiology, also specialized courses such as biomechanics of motion, human growth and development, and manifestations of disease and trauma. Besides receiving classroom instruction, students get supervised practical experience administering physical therapy to patients in a hospital or treatment center.

Several universities offer the master's degree in physical therapy. A graduate degree, combined with clinical experience, increases the opportunities for advancement, especially to teaching, research, and administrative positions.

Therapists must have patience, tact, resourcefulness, and emotional stability in order to help patients and their families understand the treatments and adjust to their handicaps. Physical therapists also should have manual dexterity and physical stamina. Many persons who want to determine whether they have the personal qualities needed for this occupation volunteer for summer or part-time work in the physical therapy department of a hospital or clinic.

Employment Outlook

Employment opportunities for physical therapists are expected to

be favorable through the mid-1980's. The rapidly growing number of new graduates is expected to be in rough balance with the average number of openings that will result each year from growth in the occupation and from replacement of those who will die or retire.

Employment in the occupation is expected to grow very rapidly through the mid-1980's because of increased public recognition of the importance of rehabilitation. As programs to aid crippled children and other rehabilitation activities expand, and as growth takes place in nursing homes and other facilities for the elderly, many new positions for physical therapists are likely to be created. Many part-time positions should continue to be available.

Earnings and Working Conditions

Starting salaries for new physical therapy graduates averaged about \$8,700 a year in 1972, according to a national survey conducted by the University of Texas Medical School at Galveston. Earnings of experienced physical therapists averaged \$10,400; some earned as much as \$17,000.

Beginning therapists employed by the Veterans Administration (VA) earned starting salaries of \$8,572 a year in early 1973. Most experienced nonsupervisory physical therapists in the VA earned about \$11,600 annually, those who are supervisors, about \$16,700.

Sources of Additional Information

Additional information is available from:

American Physical Therapy Association,
1156 15th St. NW., Washington, D.C.
20036.

REGISTERED NURSES

(D.O.T. 075.118 through .378)

Nature of the Work

Nursing care plays a major role in providing health care. As important members of the medical care team, registered nurses perform a wide variety of duties. They administer medications; observe, evaluate, and record symptoms, reactions, and progress of patients; assist in the rehabilitation of patients; and help maintain a physical and emotional environment that promotes patient recovery.

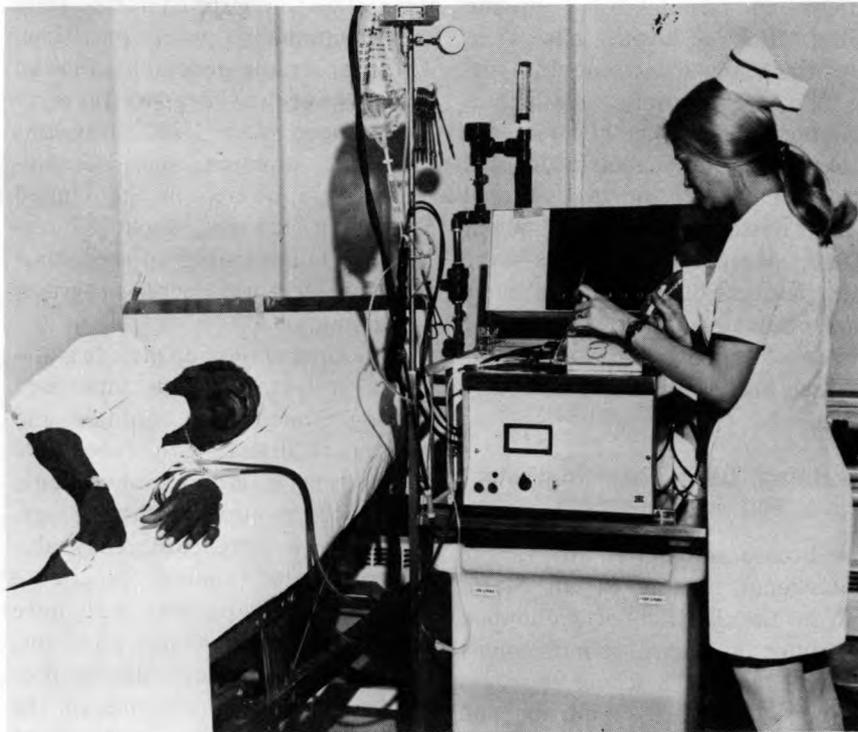
Some registered nurses provide hospital care. Other's perform research activities or instruct students. The type of employment setting usually determines the scope of the nurse's duties.

Hospital nurses constitute the largest group. Most are staff nurses who provide skilled bedside nursing care and carry out medical treatment plans prescribed by physicians. They may also supervise practical nurses, aides, and orderlies. Hospital nurses usually work with groups of patients that require similar nursing care. For instance, some nurses work with post-surgery patients; others care for children, the elderly, or the mentally ill. Some are administrators of nursing services.

Private duty nurses give individual care to patients who need constant attention. The private duty nurse may sometimes care for several hospital patients who require special care, but not full-time attention.

Office nurses assist physicians, dental surgeons, and occasionally dentists in private practice or clinics. Sometimes they perform routine laboratory and office work in addition to their nursing duties.

Public health nurses care for patients in clinics, homes, schools



Registered nurse monitors patient receiving treatment for kidney disease.

and other community settings. They instruct patients and families in proper care, and give periodic care as prescribed by a physician. They may also instruct groups of patients in proper diet and arrange for immunizations. These nurses work with community leaders, teachers, parents, and physicians in community health education. Some public health nurses, work in schools.

Nurse educators teach students the principles and skills of nursing, both in the classroom and in direct patient care. They also conduct continuing education courses for registered nurses, practical nurses and nursing assistants.

Occupational health or industrial nurses provide nursing care to employees in industry and government, and along with physicians promote employee health. As prescribed by a doctor, they treat minor injuries

and illnesses occurring at the place of employment, provide for the needed nursing care, arrange for further medical care if necessary, and offer health counseling. They also may assist with health examinations and inoculations.

(Licensed practical nurses who also perform nursing service are discussed elsewhere in the *Handbook*).

Places of Employment

Nearly 750,000 persons—all but 1 percent women—worked as registered nurses in 1972. About one-third of them worked on a part-time basis.

More than two-thirds of all registered nurses worked in hospitals, nursing homes, and related institutions. About 60,000 were office nurses and about 50,000 were private duty nurses who cared for

patients in hospitals and private homes. Public health nurses in government agencies, schools, visiting nurse associations, and clinics numbered about 54,000; nurse educators in nursing schools accounted for about 35,000; and occupational health nurses in industry, about 20,000. Most of the others were staff members of professional nurse and other organizations, State boards of nursing, or working for research organizations.

Training, Other Qualifications, and Advancement

A license is required to practice professional nursing in all States and in the District of Columbia. To obtain a license, a nurse must be a graduate of a school approved by the State board of nursing and pass the State board examination. Nurses may be licensed in more than one State, either by examination or endorsement of a license issued by another State.

Three types of educational programs—diploma, baccalaureate, and associate degree—offer the education required for basic careers in registered nursing. Education at the master's level and above is required for positions in research, consultation, teaching, and clinical specialization. Graduation from high school is required for admission to all schools of nursing.

Diploma programs are conducted by hospital and independent schools and usually require 3 years of training. Bachelor's degree programs usually require 4 years of study in a college or university, although a few require 5 years. Associate degree programs in junior and community colleges require approximately 2 years of nursing education. In addition, several programs provide licensed practical nurses with the training necessary to upgrade

themselves to registered nurses while they continue to work part-time. These programs generally offer an associate of arts degree. In early 1972, more than 1,360 programs (associate, diploma, and baccalaureate) were offered in the United States. In addition, about 80 colleges and universities offered master's and doctoral degree programs in nursing.

Programs of nursing include classroom instruction and supervised nursing practice in hospitals and health facilities. Students take courses in anatomy, physiology, microbiology, nutrition, psychology, and basic nursing care. They also get supervised clinical experience in the care of patients who have different types of health problems. Students in bachelor's degree programs as well as in some of the other programs are assigned to public health agencies to learn how to care for patients in clinics and in the patients' homes. General education is combined with nursing education in baccalaureate and associate degree programs and in some diploma programs.

Qualified students who need financial aid can get a nursing scholarship or a low-interest loan under the provisions of the Nurse Training Act of 1971.

Depending on length of service, up to 85 percent of the loan can be cancelled over a 5-year period for full-time employment as a professional nurse in any public or nonprofit institution or agency. Full-time employment in an area identified as a shortage area can make one eligible for cancellation of 85 percent of the loan over a three-year period.

Young persons who want to pursue a nursing career should have a sincere desire to serve humanity and be sympathetic to the needs of others. Nurses must be able to

follow orders precisely and to use good judgment in emergencies; they also should be able to accept responsibility and direct or supervise the activity of others. Good mental health is helpful in order to cope with human suffering and frequent emergency situations. Staff nurses may need physical stamina because of the amount of time spent walking and standing.

From staff positions in hospitals, experienced nurses may advance to head nurse, assistant director, and director of nursing services. A master's degree, however, often is required for supervisory and administrative positions, as well as for positions in nursing education, clinical specialization, and research. In public health agencies, advancement is usually difficult for nurses who do not have degrees in public health nursing.

A growing movement in nursing, generally being referred to as the "nurse practitioner program" is opening up new career possibilities. Nurses who wish to take the extra training are preparing for highly independent roles in the clinical care and teaching of patients. They are practicing in primary roles which include nurse-midwifery, maternal care, pediatrics, family health, and the care of medical patients.

Employment Outlook

Employment opportunities for registered nurses are expected to be favorable through the mid-1980's. However, if trends in the number of persons enrolling in schools of nursing continue, some competition for more desirable, higher paying jobs may develop by the mid-1980's. Opportunities for full- or part-time work in present shortage areas such as some Southern States and many inner-city areas are expected to be very favorable

through 1985. For nurses who have had graduate education, the outlook is excellent for obtaining positions as administrators, teachers, clinical specialists, public health nurses, and for work in research.

A very rapid increase in employment of registered nurses is expected because of rising population, improved economic status of the population, extension of prepayment programs for hospitalization and medical care, expansion of medical services as a result of new medical techniques and drugs, and increased interest in preventive medicine and rehabilitation of the handicapped. In addition to the need to fill new positions, large numbers of nurses will be required to replace those who leave the field each year because of marriage and family responsibilities.

Earnings and Working Conditions

Registered nurses who worked in hospitals in 1972 received average starting salaries of \$8,100 a year, according to a national survey conducted by the University of Texas Medical Branch. This was slightly above average for non-supervisory workers in private industry, except farming. Registered nurses in nursing homes can expect to earn slightly less than those in hospitals. Salaries of industrial nurses averaged \$158 a week in early 1971, according to a survey conducted by the Bureau of Labor Statistics (BLS).

In early 1973, the Veterans Administration paid inexperienced nurses who had a diploma or an associate degree starting salaries of \$8,572 a year; those with baccalaureate degrees, \$10,012. Graduates of associate degree programs entered at \$8,256, and those who had a baccalaureate degree or diploma began at \$8,722 in other Federal

Government agencies.

Most hospital nurses receive extra pay for work on evening or night shifts. Nearly all receive at least 2 weeks of paid vacation after 1 year of service. Most hospital nurses receive from 5 to 13 paid holidays a year and also some type of health and retirement benefits.

Sources of Additional Information

For information on approved schools of nursing, nursing careers, loans, scholarships, salaries, working conditions, and employment opportunities, contact:

ANA Committee on Nursing Careers,
American Nurses' Association, 2420
Pershing Rd., Kansas City, Mo. 64108.

Information about employment opportunities in the Veterans Administration is available from:

Department of Medicine and Surgery,
Veterans Administration, Washing-
ton, D.C. 20420.

piratory conditions arising from head injury or drug poisoning. The short span of time for which a patient can safely cease to breathe emphasizes the highly responsible role of the respiratory therapist. If breathing has stopped for longer than 3 to 5 minutes, there is little chance that the patient can recover without brain damage, and if oxygen is cut for more than 9 minutes, he will die.

Respiratory therapists follow doctors' orders and use special equipment such as respirators and positive-pressure breathing machines to administer gas therapy, aerosol therapy, and other treatments involving respiration. They also show patients and their families how to use the equipment at home. Other duties include keeping records of the cost of materials and charges to patients, and maintaining and making minor repairs to equipment.

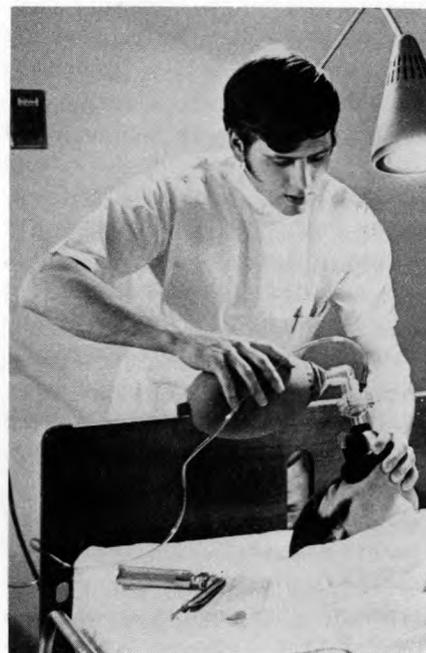
Respiratory therapists and respiratory therapy technicians perform essentially the same duties. However, the therapist is expected to have a higher level of expertise

RESPIRATORY THERAPISTS

(D.O.T. 079.368)

Nature of the Work

Respiratory therapists and technicians, sometimes called inhalation therapists, treat patients with respiratory problems. This treatment may range from giving temporary relief to patients with chronic asthma or emphysema to giving emergency care in cases of heart failure, stroke, drowning, and shock. Respiratory therapists also are among the first medical specialists called for emergency treatment of acute res-



and may be expected to assume some teaching and supervisory duties.

Places of Employment

About 17,000 people worked as respiratory therapists or technicians in 1972—about one-half were women. Most work in respiratory therapy, anesthesiology, or pulmonary medicine departments of hospitals. Others work for oxygen equipment rental companies, ambulance services, nursing homes, and universities. Women are increasingly entering this field, which has been mostly staffed by men.

Training, Other Qualifications, and Advancement

Respiratory apparatus has become increasingly complex in recent years and, although a few therapists are trained on the job, formalized training is now stressed as the requisite for entry to the field.

In 1972, more than 100 institutions offered educational programs in respiratory therapy approved by the Council on Medical Education of the American Medical Association. High school graduation is required for entry. Courses vary in length between 18 months and 4 years and include both theory and clinical work. A bachelor's degree is awarded for completion of a 4-year program and lesser degrees are awarded for shorter courses. Areas of study include human anatomy and physiology, chemistry, physics, microbiology, and mathematics. Technical courses offered deal with procedures, equipment, and clinical tests.

Respiratory therapists with an associate degree from an AMA-approved program and 1 year of experience are eligible to be registered by the American Registry of

Inhalation Therapists (ARIT). Applicants must pass written and oral examinations. In 1972, nearly 1,800 therapists had been registered. A registered inhalation therapist often can advance faster and obtain a higher position than one who is not registered. An increasing number of employers recognize registration as an acknowledgement of a therapist's qualifications.

Those who do not qualify or fail to pass the registry examination may elect to take the examination to become Certified Respiratory Therapy Technicians. This CRTT examination is less comprehensive than the registry examination. To be eligible for it, applicants must have completed either an associate degree respiratory therapy program or a 1-year respiratory therapy technician program, either of which must be approved by the Council on Medical Education of the American Medical Association.

Respiratory therapists can advance to positions as assistant chief, chief therapist, or, with graduate education, instructor of respiratory therapy at the college level.

People who want to enter the respiratory therapy field should be able to work with patients and understand their physical and psychological needs. Respiratory therapists must be able to pay attention to detail, follow instructions, and work as part of a team. Operating the complicated respiratory therapy equipment also requires some mechanical ability.

Employment Outlook

Employment opportunities for respiratory therapists and technicians are expected to be very good through the mid-1980's. Those with advanced training in respiratory therapy programs will be in demand

to fill teaching and supervisory positions.

A rapid growth in employment of respiratory therapists is expected, owing to new uses for respiratory therapy, increased acceptance of its use, and the growth in health services in general. Many specialists in respiratory therapy will be hired to release nurses and other personnel now performing respiratory therapy work to return to their primary duties. Many other openings will arise from the need to replace those who retire, die, or leave the occupation for other reasons.

Earnings and Working Conditions

The starting salary of respiratory therapy personnel employed in hospitals and medical centers averaged about \$604 a month in 1972, according to a survey conducted by the University of Texas Medical Branch. Top salaries of respiratory therapists in hospitals ranged as high as \$960 a month.

The Federal Government paid respiratory therapists starting salaries of \$6,128 a year in 1973 if they had 1 year of post-secondary training, and \$6,882 for those with 2 years of training. Some therapists employed by the Federal Government in early 1973 earned as much as \$12,373 a year.

Respiratory therapists who work in hospitals receive the same benefits as other hospital personnel, including hospitalization, paid vacations, and sick leave. Some institutions provide tuition assistance or free courses, pension programs, uniforms, and parking.

Therapists generally work a 40-hour week. After-hours and weekend duty is generally required since most hospitals have 24-hour coverage throughout the week. Adherence to safety precautions and testing proper operation of

equipment minimizes the potential hazard of fire to therapists and patients.

Sources of Additional Information

Information concerning education programs is available from:

American Association for Respiratory Therapy, 7411 Hines Place, Dallas, Tex. 75235.

On-the-job training information can be obtained at local hospitals.

SANITARIANS

(D.O.T. 079.118)

Nature of the Work

Sanitarians, frequently called environmentalists, are specialists in environmental health. They perform a broad range of duties to protect the cleanliness and safety of the food people eat, the liquids they drink, and the air they breathe.

Sanitarians check the cleanliness and safety of food and beverages produced in dairies and processing plants, or served in restaurants, hospitals, and other institutions. They often examine the handling, processing, and serving of food for compliance with sanitation rules and regulations. Sanitarians also may develop and manage programs to prevent contamination, control insects and rodents, properly dispose of refuse, and insure adequate sanitary water supplies.

Sanitarians concerned with waste control oversee the treatment and disposal of sewage, refuse, and garbage. They examine places where pollution is a danger, perform tests to detect pollutants, and collect air or water samples for analysis. San-



Sanitarian uses air samples to check bacteria carried on a hospital worker.

itarians determine the nature and cause of the pollution, then initiate action to stop it.

Public health sanitarians work closely with doctors, nurses, and public health officers to prevent and investigate outbreaks of disease. They may conduct surveys to determine the adequacy of health regulations or perform sanitary inspections of schools, houses, swimming pools, and recreation facilities. They also plan for civil defense and emergency disaster aid. Sometimes sanitarians teach health education classes and lecture to student assemblies, civic groups, and other organizations.

Professional sanitarians work closely with a variety of other workers such as life and environmental scientists, waste water

treatment plant operators, and environmental health technicians. Environmental health technicians may help them perform routine duties such as compliance inspections, collection of air and water samples, and testing for pollutants.

Sanitarians who have supervisory duties analyze reports of inspection and investigations, and occasionally give evidence in court cases involving violations of sanitation and health regulations. Sanitarians in top administrative positions plan and direct environmental health programs and coordinate them with the programs of other agencies. Other duties may include advising on difficult or unusual environmental health problems, and drafting health laws or regulations.

In large local and State health

or agriculture departments, sanitarians may specialize in areas of work such as milk and dairy products, food sanitation, waste control, air pollution, institutional sanitation, and occupational health. In rural areas and small cities, they may be responsible for a wide range of environmental health activities.

Increasing numbers of sanitarians work in private industry to minimize contamination and pollution hazards and make sure that working conditions are healthy, safe, and clean. They frequently work closely with government sanitarians who enforce health, safety, and pollution laws and regulations.

Places of Employment

About 17,000 persons, mostly men, worked as sanitarians in 1972. Three out of every four worked for State and local governments. Most of the remainder worked for producers and processors of food and dairy products. A small number were teachers in colleges and universities. A few were consultants. Others worked in hospitals and for trade associations and other organizations. Most sanitarians work in populous areas.

Training, Other Qualifications, and Advancement

Laws in 35 States provided for the registration of sanitarians in 1972; in some States, registration is mandatory. Although requirements for registration vary considerably among States, the minimum educational requirement usually is a bachelor's degree. A bachelor's degree in environmental health is preferred for beginning sanitarian jobs, although a major in any environmental, life, or physical science generally is acceptable. Administrative, teaching, and research jobs

usually require a graduate degree in some aspect of public health.

In 1972, 58 colleges and universities offered undergraduate or graduate programs in environmental health. A typical curriculum leading to a bachelor of science degree in environmental health includes background courses in the humanities, social sciences, mathematics, chemistry, physics, and biology. Core courses include microbiology (bacteriology); biostatistics, epidemiology, environmental sciences, administration, and field work.

Sanitarians usually begin at a trainee level and work under the supervision of experienced sanitarians for up to a year. They receive on-the-job training in environmental health practice, learn to evaluate health and sanitation hazards and recommend corrective action. After a few years of experience, they may be promoted to minor supervisory positions with more responsibilities. Specialization may begin after several years of experience, especially in large local health offices. Further advancement is possible to top supervisory and administrative positions.

To keep abreast of new developments and to supplement their academic training, many sanitarians take specialized short-term training courses in subjects such as occupational health, water supply and pollution control, air pollution, protection from dangers of radiation, milk and food inspection, metropolitan planning, and hospital sanitation.

Young people interested in becoming sanitarians should like working with detail and possess a mechanical aptitude, since sanitarians may operate various testing devices. An ability to communicate effectively, both orally and in writing is necessary for writing detailed reports and tactfully dealing with persons

concerning the correction of unsanitary conditions.

Employment Outlook

Employment opportunities for sanitarians who have a bachelor's degree in environmental health are expected to be very good through the mid-1980's, particularly in private industry. The outlook for those having degrees in life, physical, or environmental sciences is expected to be favorable.

Employment of sanitarians is expected to increase very rapidly through the mid-1980's in response to anticipated expansion of public and private programs dealing with food sanitation, water and air pollution, and occupational health. Underlying the demand for sanitarians in the private sector will be industrial growth and an increasing recognition by industry of its responsibility for safe and sanitary products and healthful environment. Demand for sanitarians in the public sector will be generated by an expansion of the environmental health activities of State and local governments. Increasing public concern with health hazards, waste management, radiation danger, and pollution is expected to require the services of more sanitarians. Population growth, continued migration of people from rural to urban areas, and industrial growth will place a greater strain on food services, housing, and sewage disposal facilities of urban communities.

Earnings and Working Conditions

Starting salaries of sanitarians employed by State governments averaged \$7,800 annually, in early 1972, according to a survey of State and selected local governments conducted by the Public Personnel Association. Maximum salaries of

journeymen sanitarians in State governments averaged \$10,000 annually; annual salaries were about \$1,000 higher for sanitarians working for local governments. Salaries of supervisory sanitarians and sanitarians having extensive experience ranged to more than \$20,000.

Sanitarians employed by the Federal Government started at \$7,319 or \$9,053 in 1972, depending on their academic records. Experienced sanitarians in the Federal service earned from \$11,046 to \$20,627.

Sanitarians spend considerable time away from their desks. Some come in contact with unpleasant physical surroundings, such as sewage disposal facilities and slum housing. Transportation or gasoline allowance frequently are given, and some health departments provide an automobile.

Sources of Additional Information

Information about careers as sanitarians is available from the following associations:

American Public Health Association,
1015 18th St. NW., Washington, D.C.
20036.

International Association of Milk, Food,
and Environmental Sanitarians, Blue
Ridge Rd., P.O. Box 437, Shelbyville,
Ind. 46176.

National Environmental Health Association,
1600 Pennsylvania St., Denver,
Colorado 80203.

Information on stipends for graduate study is available from:

Division of Allied Health Manpower,
Bureau of Health Professions Education
and Manpower Training, National
Institute of Health, 9000 Rockville
Pike, Bethesda, Md. 20014.

SPEECH PATHOLOGISTS AND AUDIOLOGISTS

(D.O.T. 079.108)

Nature of the Work

About 1 out of 10 Americans is unable to speak or hear clearly. Children who have trouble speaking or hearing cannot participate fully with other children in play or in normal classroom activities. Adults having speech or hearing impairments often have problems in job adjustment. Speech pathologists and audiologists provide direct services to these people by evaluating their speech or hearing disorders and then providing treatment.

The speech pathologist works with children and adults who have speech, language, and voice disorders resulting from causes such as total or partial hearing loss, brain injury, cleft palate, mental retardation, emotional problems, or foreign dialect. The audiologist primarily assesses and treats hearing problems. Speech and hearing, however, are so interrelated that to be competent in one of these fields, one must be familiar with both.

The duties of speech pathologists and audiologists vary with education, experience, and place of employment. In clinics, either in schools or other locations, they use diagnostic procedures to identify and evaluate speech and hearing disorders. Then, in cooperation with physicians, psychologists, physical therapists, and counselors, they develop and implement an organized program of therapy. Some speech pathologists and audiologists conduct research such as investigating the causes of communicative disorders and improving methods for clinical services. Others supervise clinical activities or do other administrative work.

Speech pathologists and audiologists in colleges and universities instruct in the principles and bases of communication, communication disorders, and clinical techniques; participate in educational programs with physicians, nurses, and teachers; and work in university clinics and research centers.

Places of Employment

About 27,000 persons, three-fourths of them women, worked as speech pathologists and audiologists in 1972. About two-thirds worked in public schools. Colleges and universities employed many in classrooms, clinics, and research centers. The rest were distributed among hospitals, speech and hearing centers, government agencies, industry, and private practice.

Training, Other Qualifications, and Advancement

Although only a few States presently require a master's degree for work in schools, the master's degree or its equivalent increasingly is needed. A teacher's certificate often is required. In addition, some States require workers dealing with handicapped children to have special training. Speech pathologists and audiologists who supervise many Federal programs, such as Medicare and Medicaid, need a master's degree.

Undergraduate courses in speech pathology and audiology include anatomy, biology, physiology, physics, linguistics, semantics and phonetics. Courses in speech and hearing as well as in child psychology and psychology of the exceptional child are also helpful. This training is usually available at colleges that offer a broad liberal arts program.

In 1972, more than 200 colleges



and universities offered graduate education in speech pathology and audiology. Courses at the graduate level include advanced anatomy and physiology of the areas involved in hearing and speech, acoustics, and psychological aspects of communication. Training also is given in the analysis of speech production, language abilities, and auditory processes. Graduate students gain a familiarity with research methods used to study speech and hearing.

Scholarships, fellowships, assistantships and traineeships are available in this field. Teaching and training grants to colleges and universities that have programs in speech and hearing are given by the U.S. Rehabilitation Services Administration, the Maternal and Child Health Service, the U.S. Office of Education, and the National Institutes of Health. In addition, some Federal agencies distribute money to colleges to aid graduate students in speech and hearing programs.

Opportunity for advancement, as in most health service occupations, is generally not an important con-

sideration for speech pathologists and audiologists. However, meeting the American Speech and Hearing Association's (ASHA) requirements for a Certificate of Clinical Competence usually is necessary in order to advance professionally and to earn a higher salary. ASHA members work in all areas of speech pathology and audiology. Most speech pathologists and audiologists have some administrative responsibilities. However, directors of speech and hearing clinics, and coordinators of speech and hearing in schools, health departments or government agencies, may be totally involved in administration.

Speech pathologists and audiologists should like people; have the ability to approach problems objectively; and should be sensitive, patient, and emotionally stable. A person who desires a career in speech pathology and audiology should be able to accept responsibility, work independently, and direct others. The ability to work with detail is important. Speech pathologists and audiologists have

an opportunity for self-expression and receive satisfaction from seeing the results of their work.

Employment Outlook

The employment of speech pathologists and audiologists is expected to increase moderately through the mid-1980's. For those who have completed graduate study, opportunities are expected to be very good. Although some jobs will be available for those having only a bachelor's degree, the increasing emphasis being placed on the master's degree by State governments and Federal agencies will limit opportunities at the bachelor's level.

Population growth which will increase the number of persons having speech and hearing problems is one of the principal factors underlying the expected moderate increase in employment of speech pathologists and audiologists through the mid-1980's. In addition, the trend is growing toward earlier recognition and treatment of hearing and language problems in children. Many school-age children, thought to have learning disabilities, actually have language disorders which speech pathologists can treat.

Other factors expected to increase demand for speech pathologists and audiologists are the rapid expansion in expenditures for medical research and the growing public interest connected with speech and hearing disorders. These are illustrated by the Elementary and Secondary Education Act, as amended, which provides for the education of handicapped children, and expanded Federal programs such as Medicare and Medicaid.

Earnings and Working Conditions

Median salaries of speech pathologists and audiologists teaching

in colleges and universities range from \$9,900 to \$18,500 for a 9-10 month contract in 1972, according to limited data available. Median salaries might be as much as \$2,000 higher for an 11 to 12 month contract. Many experienced speech pathologists and audiologists in colleges and universities supplement their regular salaries by doing consulting work, special research projects, and writing books and articles.

In 1972, speech pathologists and audiologists in schools averaged \$11,500 for a 9-10 month contract according to limited information

available. Their average salaries were over \$1,000 higher than those of all classroom teachers for the same period.

In early 1973, the annual starting salary in the Federal Government for speech pathologists and audiologists with a master's degree was \$11,614. Those having a doctoral degree were eligible to start at \$13,996.

Many speech pathologists and audiologists work over 40 hours a week. Almost all receive fringe benefits such as paid vacations, sick leave, and retirement programs.

Sources of Additional Information

State departments of education can supply information on certification requirements for those who wish to work in public schools.

A list of college and university programs and a booklet on student financial aid as well as general career information are available from:

American Speech and Hearing Association, 9030 Old Georgetown Rd., Washington, D.C. 20014.

SOCIAL SCIENCE OCCUPATIONS

The social sciences are concerned with all aspects of human society from the origins of man to the latest election returns. Social scientists, however, generally specialize in one major field of human relationships. Anthropologists study primitive tribes, reconstruct civilizations of the past, and analyze the cultures and languages of all peoples, past and present. Economists study the allocation of land, labor, and capital. Geographers study the distribution of people, throughout the world, types of land and water masses, and natural resources. Historians describe and interpret the people and events of the past and present. Political scientists study the theories, objectives, and organizations of all types of government. Sociologists analyze the behavior and relationships of groups—such as the family, the community, and minorities—to the individual or to society as a whole. Besides these basic social science occupations, a number of closely related fields are covered in separate statements elsewhere in this *Handbook*. (See statements on Statisticians, Psychologists, and Social Workers.)

The basic social science occupations provided employment for about 95,000 persons in 1972; about 10 percent of them were women. Overlapping among the basic social science fields and the sometimes hazy distinction between these and related fields such as business administration, foreign service work, and high school teaching, make it difficult to determine the exact size of each profession. Economists, however, are the largest social science group, and anthropologists the smallest.

Most social scientists work in col-

leges and universities. A large number work for the Federal Government and private industry. The trend in some industries is to hire increasing numbers of social science majors as trainees for administrative and executive positions. Research councils and other non-profit organizations provide an important source of employment for economists, political scientists, and sociologists.

Overall employment in the social sciences is expected to grow moderately through the mid-1980's. Teaching in colleges and universities will remain the major area of employment. Employment of social scientists in government, private industry, and nonprofit organizations is expected to rise also. Despite this anticipated growth, the number of persons seeking to enter the social science field is likely to exceed available job openings. The following statements present more detailed information about the prospective outlook in the individual occupations.

ANTHROPOLOGISTS

(D.O.T. 055.088)

Nature of the Work

Anthropologists study man—his origins, physical characteristics, and culture. These areas include a study of the people's traditions, beliefs, customs, languages, material possessions, social relationships, and value systems. Although anthropologists generally specialize in one of these areas, they are expected to have a general knowledge of all of them.

Most anthropologists specialize in cultural anthropology, sometimes called ethnology. *Ethnologists* may spend long periods living with tribal groups or in other communities to learn about their ways of life. The ethnologist takes detailed and comprehensive notes that describe the social customs, beliefs, and material possessions of the people. He usually learns the native language in the process. He also makes comparative studies of the cultures and societies of various groups. In recent years, such investigations have included complex urban societies.

Archeologists excavate places where people of past civilizations lived. They study the remains of homes, tools, clothing, ornaments, and other evidences of human life and activity to reconstruct the inhabitants' history and customs. For example, archeologists are digging in the Pacific Coast area between northern Mexico and Ecuador to find evidences of trade and migration in the pre-Christian Era. Some archeologists are excavating ancient Mayan cities in Mexico and restoring temples. Others are working in the Missouri River valley to salvage remnants of Indian villages and sites of early military forts and trading posts.

Some anthropologists specialize in *linguistics*, the scientific study of the sounds and structures of languages and of the historical relationships among languages. They study the relationship between the language and the behavior of people. Their work assists in reconstructing the prehistory of mankind.

Physical anthropologists study human evolution. They do comparative studies of the physical characteristics of different races or groups of people as influenced by heredity and environment. In order to perform these tasks, physical anthropologists need extensive training in human anatomy and biology. Because of



their knowledge of body structure, physical anthropologists occasionally are employed as consultants on projects such as the design of driver seats, space suits, cockpits for airplanes and spaceships, and the sizing of clothing. They consult on projects to improve environmental conditions and on criminal cases. They are increasingly employed in medical schools.

Closely related to the four basic subfields is *applied anthropology*, an

emerging specialty which attempts to use the findings in the other anthropological areas in a practical manner. Applied anthropologists may, for example, provide technical guidelines to ease the transition of nonindustrial societies to a more complex level of socioeconomic organization. Another related specialty area is *urban anthropology*, which is the study of urban life, urbanization, rural-urban migration, and the influence of city life.

Most anthropologists teach in colleges and universities. They often combine teaching with research. Some anthropologists specialize in museum work, which generally combines managerial and administrative duties with field work and research on anthropological collections. A few work as consultants or engage in nontechnical writing, or other activities.

Places of Employment

About 3,700 persons—about one-fifth of them women—worked as anthropologists in 1972. About four-fifths of all anthropologists work in colleges and universities. Several hundred work in private industry and nonprofit organizations. The Federal Government employs a small number, chiefly in museums, national parks, in the Bureau of Indian Affairs, and in technical aid programs. State and local government agencies also employ some anthropologists, usually for museum work or health research.

Training, Other Qualifications, and Advancement

Students who want to become anthropologists should get the Ph.D. degree. College graduates with bachelor's degrees often get temporary positions and assistantships in the graduate departments where they are working for advanced degrees. A master's degree, plus field experience, is sufficient for many beginning professional positions, but promotion to top positions is generally reserved for individuals who have a Ph.D. degree. Anthropologists in many colleges and most universities need a Ph.D. degree to get permanent teaching appointments.

Some training in archeology, linguistics, and physical and cultural

anthropology is necessary for all anthropologists. Mathematics is helpful, since statistical and computer methods are becoming more widely used for research in this field. Undergraduate students may begin their field training in archeology by arranging, through their university departments, to accompany expeditions as laborers or to attend field schools established for training. They may later advance to supervisor in charge of the digging or collection of material and finally may direct a portion of the work of the expedition. Ethnologists and linguists usually work independently in doing their field work. Most anthropologists base their doctoral dissertations on data collected through field research; they are, therefore, experienced fieldworkers by the time they earn the Ph.D. degree.

About 200 colleges and universities have bachelor degree programs in anthropology; nearly 130 offer master's degree programs and about 80, doctorate programs. Most universities that have graduate programs also offer undergraduate training in anthropology. The choice of a graduate school is very important. Students interested in museum work should select a school that can provide experience in an associated museum that has anthropological collections. Similarly, those interested in archeology should either choose a university that offers opportunities for summer experience in archeological fieldwork, or else should plan to attend an archeological field school elsewhere during their summer vacations.

Anthropologists should be persons who have an above average interest in natural history or social studies and enjoy reading, research, and writing. A desire to travel and the ability to cope with the disadvantages of remote work areas are sometimes necessary for success.

Anthropologists work with ideas and have the opportunity for self-expression. They should have the ability to work with detail and work independently.

Employment Outlook

Employment in this rather small occupation is expected to increase very rapidly through the mid-1980's. The largest area of employment will continue to be in college and university teaching. However, an increasing number of jobs will be available for anthropologists in museums, and in programs of archeological research, mental and public health, and poverty and community action, as well as in private industry.

The number of graduates with advanced degrees in anthropology also is expected to grow very rapidly, and it is very likely that the number seeking to enter the field will exceed job openings generated by growth as well as replacement needs. As a result, anthropologists holding the doctorate may face keen competition for positions of their choice through the mid-1980's. Graduates with only the master's degree are expected to face very persistent competition for professional positions in anthropology and may have to enter related fields of work such as mental health or poverty programs. Some who meet certification requirements may secure high school teaching positions. Others may find jobs in government, and in nonprofit organizations and civic groups that hire personnel with social science training as a general background.

Earnings and Working Conditions

Starting salaries for anthropologists with a Ph.D. degree were generally about \$12,000 a year in 1972. Experienced anthropologists

earned median salaries of \$16,000 a year, according to limited data available. They may, however, earn more than \$20,000 a year.

In the Federal Government, starting salaries for anthropologists having a master's degree were \$11,614 a year in early 1973, and for those having a Ph.D., \$13,996. Experienced anthropologists earned from \$16,700 to more than \$23,000 a year.

Many anthropologists who work in colleges and universities supplement their regular salaries with earnings from other sources such as summer teaching and research grants.

Anthropologists doing archeological fieldwork sometimes are required to work in adverse weather conditions and perform manual labor. They also must adapt themselves to cultural environments which are materially and socially different.

Sources of Additional Information

For information about employment opportunities and schools that offer graduate training in anthropology, contact:

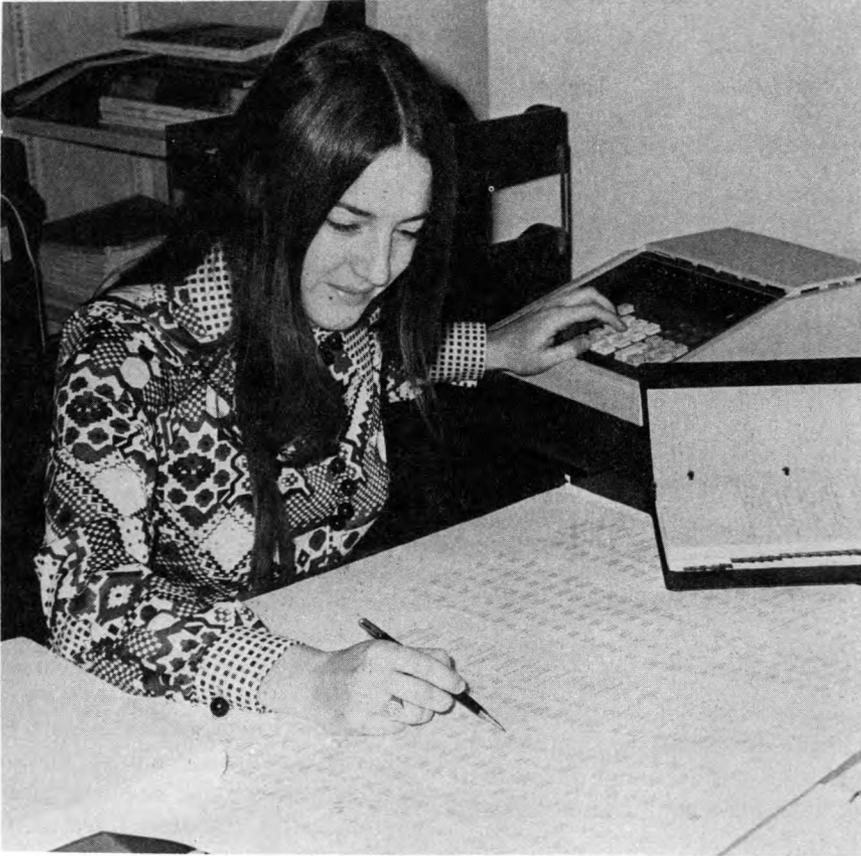
The American Anthropological Association, 1703 New Hampshire Ave. NW., Washington, D.C. 20009.

ECONOMISTS

(D.O.T. 050.088)

Nature of the Work

Economics is concerned with how to utilize scarce resources to provide goods and services for society. Economists study the problems that arise in the use of such resources as



Economist analyzes results of computer printout.

land, raw materials, and manpower. Economists analyze the relationship between the supply of goods and services and demand for them, on the one hand, and on the other, how goods and services are produced, distributed, and consumed. Some economists are concerned with such practical matters as the control of inflation, business cycles, and unemployment, as well as farm, wage, tax, and tariff policies. Others develop theories to explain the causes of employment and unemployment or the ways in which international trade influences world economic conditions. Still others collect, analyze, and interpret data on a wide variety of economics problems.

Economists who work in colleges

and universities teach the theories, principles, and methods of economics and conduct or direct research. They frequently write, and act as consultants.

Economists in government plan and carry out studies used to assess economic conditions and the need for changes in government policy. To accomplish this work they collect data, analyze it, and prepare reports. Most government economists are in the fields of agriculture, business, finance, labor, or international trade and development.

Economists who work for business firms provide management with information to make decisions on marketing and pricing of company products; the effect of government

policies on business or international trade; or the advisability of adding new lines or merchandise, opening new branch operations, or otherwise expanding the company's business.

Places of Employment

Economics is the largest social science field. More than 36,000 persons, about 6 percent of them women, worked as economists in 1972. Private industry and business employ one-half; colleges and universities about one-third; and government agencies—mainly Federal—roughly one-sixth. A few are self-employed or work for private research organizations.

Economists work in all large cities and university towns. The largest number are in the New York City and the Washington, D.C. metropolitan areas. Some work overseas, mainly for the U.S. Department of State and the Agency for International Development.

Training, Other Qualifications, and Advancement

Economists must have a thorough understanding of economic theory and methods of economic analysis. An increasing number of universities emphasize the value of mathematical methods of economic analysis. Since many beginning jobs for economists in government and business involve the collection and compilation of data, a thorough knowledge of basic statistical procedures usually is required.

A bachelor's degree with a major in economics is sufficient for many beginning research jobs in government and private industry, although persons employed in these entry jobs are not usually regarded as professional economists. In the Federal Government, candidates for entrance positions must have a mini-

mum of 21 semester hours of economics and 3 hours of statistics, accounting, or calculus.

Graduate training is very important for persons who want to become economists. Students interested in research should select schools that emphasize training in research methods and statistics and provide good research facilities. Those who wish to work in agricultural economics will find opportunities to gain experience in part-time research work at State universities that have agricultural experiment stations.

A master's degree generally is required to get a job as a college instructor, although in large schools graduate assistantships sometimes are awarded to superior students working toward their master's degrees. In many large colleges and universities, completion of all the requirements for a Ph.D. degree, except the dissertation, is necessary for appointment as instructor. In government or private industry, economists who have a master's degree usually can qualify for more responsible research positions.

The Ph.D. degree is required for a professorship in a high-ranking college or university and is an asset when competing for other responsible positions in government, business, or private research organizations.

About 800 colleges and universities offer bachelor degree programs in economics, 200 master's, and 100 doctorate.

Persons who consider careers as economists should be able to work accurately and in detail—since much time is spent on research. Frequently, the ability to work as part of a team is required. Economists must be objective in their work and be able to express themselves effectively orally or in writing, since they do many reports and presentations.

Employment Outlook

The number of persons who will graduate with degrees in economics through the mid-1980's is likely to exceed available positions that will arise from the expected moderate growth of the occupation and the need to replace economists who will die and retire during this period. As a result well-trained economists having a doctorate or master's degree are expected to face keen competition for choice academic positions. Persons who have bachelor's degrees in economics may find some employment in government, industry and business as trainees or management interns, but competition may be keen.

Private industry and business will continue to provide the largest number of employment opportunities for economists because of increased reliance on scientific methods of analyzing business trends, forecasting sales and planning purchases and production operations. The next largest area of employment opportunities for economists will be in colleges and universities where a projected moderate increase in enrollments will lead to a similar increase in faculty size. Employment of economists in State and local government agencies is expected to increase rapidly because of the increasingly analytical nature of programs in areas such as housing and poverty. Employment of economists in the Federal Government is expected to rise slowly—in line with the rate of growth projected for the Federal work force as a whole.

Earnings

Starting salaries for economists with a Ph.D. were nearly \$12,000 a year in 1972, according to limited information. Salaries of economists employed by colleges and universities in 1972 averaged about \$20,

000, and for those in business, industry, and nonprofit organizations it was about \$22,000. Economists who have a Ph.D. are paid higher salaries than those who have lesser degrees and similar experience. A substantial number of economists supplement their basic salaries by consulting, teaching, and other research activities. Economists earn about twice as much as the average earnings for non-supervisory workers in private industry or private nonfarm payrolls.

In the Federal Government, the entrance salary for beginning economists having a bachelor's degree was \$7,694 a year in 1973; however, those with superior academic records could begin at \$9,520. Those having 2 full years of graduate training or experience could qualify for positions at an annual salary of \$11,614. Most experienced economists in the Federal Government earned from \$17,000 to \$23,000 a year; some having greater administrative responsibilities earned considerably more.

Sources of Additional Information

Additional information on a career as an economist is available from:

American Economic Association, 1313
21st Avenue South, Nashville,
Tenn. 37212.

GEOGRAPHERS

(D.O.T. 029.088 and 059.088)

Nature of the Work

Geographers study the spatial characteristics of the earth's terrain, minerals, soils, water, vegetation, and climate. They relate these char-

acteristics to changing patterns of human settlement—where people live, why they are located there, and how they earn a living.

The majority of geographers are college or university teachers; some combine teaching and research. Their research includes the study and analysis of the distribution of land forms, climate, soils, vegetation, and mineral and water resources. They also analyze the distribution and structure of political organizations, transportation systems, marketing systems, and urban systems. Many geographers spend considerable time in field study, and in analysing maps, aerial photographs, and observational data collected in the field. Sometimes they utilize surveying and meteorological instruments. Photographs and other data from remote sensors on satellites are used increasingly. Other geographers construct maps, graphs, and diagrams.

Most geographers specialize in one branch or more of geography. *Economic geographers* deal with the geographic distribution of economic activities—including manufacturing, mining, farming, trade, and communications. *Political geographers* study how political processes affect geographic boundaries on subnational, national, and international scales and the relationship of spatial processes (geographic conditions) to political processes. *Urban geographers* study cities and their problems in depth, and are concerned with city and community planning. (See statement on Urban Planners elsewhere in the *Handbook*.) *Physical geographers* study the physical characteristics of the earth and moon. *Regional geographers* study the physical, economic, political, and cultural characteristics of a particular region or area, which may range in size from a river basin or an island, to a State, a country, or even a continent. *Cartographers* compile

data and design and construct maps.

Many geographers have job titles such as cartographer, map cataloger, or regional analyst, that describe their specialization. Others have titles that relate to the subject matter of their study such as photo-intelligence specialist or climatological analyst. Still others have titles such as community or environmental planner, or market or business analyst. Most of those who teach in colleges and universities are called geographers.

Places of Employment

About 7,500 persons worked as geographers in 1972; about 15 percent were women.

Colleges and universities employ more than two-thirds of all geographers. The Federal Government employs a large number. Among Federal agencies, the Department of Defense employs the largest number in such agencies as the Defense Mapping Agency, the Aeronautical Chart and Information Center, Naval Intelligence. The Commerce Department employs geographers in such agencies as the Coast and Geodetic

Survey, Bureau of the Census, Office of Regional Commissions, National Oceanic and Atmospheric Administration and National Weather Service. Geographers employed by the Interior Department work in such agencies as Bureau of Indian Affairs, Bureau of Outdoor Recreation, Bureau of Land Management and Geological Survey. Other government agencies that employ geographers include the Central Intelligence Agency (CIA), Office of Emergency Planning, National Aeronautical and Space Administration (NASA), and the Library of Congress.

Training, Other Qualifications, and Advancement

The educational requirement for beginning positions in geography is usually a bachelor's degree with a major in the field. For research and teaching jobs, and for advancement, graduate training is usually required. A Ph.D. is preferred.

In the Federal Government, candidates for entrance positions must have a minimum of 15 semester hours in geography and 9 hours in related fields such as statistics or economics. For an applicant to start at a higher level, he needs 30 hours in geography and related fields and a year of graduate study or work experience as a geographer.

About 380 colleges and universities offered degree training in geography in 1972. Undergraduate study provides a general introduction to geographic knowledge and research methods and often includes some field studies. Typical courses offered are physical and cultural geography, weather and climate, economic geography, political geography, urban geography, weather and climate, quantitative methods in geography, and comparative courses such as the geography of North



America and the USSR. Courses in cartography and in the interpretation of maps and aerial and satellite photographs also are offered.

State and local governments also employ small numbers of geographers, mostly on city and State planning and development commissions.

A small but growing number of geographers work in private industry. Most work for marketing research organizations, textbook and map publishers, travel agencies, manufacturing firms or chain stores. A few work for scientific foundations and research institutes.

In 1972, 115 institutions offered master's degree programs; 50 offered Ph.D. programs. Admittance to a graduate program usually requires a bachelor's degree with a major in geography. However, many universities admit students with bachelor's degrees in any of the social or physical sciences with some background in geography. Requirements for advanced degrees include field and laboratory work as well as advanced classroom studies in geography and thesis preparation. Many graduate schools also require course work in advanced mathematics and computer science because of the increasing emphasis on these areas in the field. A language is required for those students who plan to enter the field of foreign regional geography.

Persons who want to become geographers should enjoy reading, studying, and research because they must keep abreast of developments in the field. Geographers must work with abstract ideas and theories as well as do practical studies. They also must be able to work independently and communicate their ideas orally and in writing.

Employment Outlook

The employment outlook for ge-

ographers with the Ph.D. is expected to be favorable through the mid-1980's for positions in research and teaching in college and universities and for research jobs in industry and government. Those with the master's degree are likely to face some competition for choice academic positions; however, expanding geography programs in junior colleges should provide some jobs. Colleges and universities will continue to provide the largest number of employment opportunities for geographers because of the expected increase in college enrollment through the mid-1980's. Some other jobs should be available in research for government or private industry.

Graduates who have only the bachelor's degree in geography usually are not qualified for jobs as professional geographers. However, they may find positions connected with making, interpreting, or analyzing maps; or in research, either working for the government or industry. Others enter beginning positions in the planning field. Some may obtain employment as research or teaching assistants in educational institutions while studying for advance degrees. Some bachelor's degree holders do teach at the high school level. Some earn library science degrees and become map librarians.

Employment of geographers in government is expected to increase. The Federal Government will need additional personnel to work in programs such as regional development, environmental quality, and intelligence. Employment of geographers in State and local governments also is expected to expand, particularly in areas such as conservation, environmental quality control, highway planning, and city, community, and regional planning and development. Private industry also is expected to employ increas-

ing numbers of geographers for market research and location analysis.

Earnings

Salaries of geographers in colleges and universities depend on their teaching rank and experience. Assistant professors entering the field with a Ph.D. and no experience started at between \$10,500 and \$11,000 in 1972, according to limited information. Nearly three-fourths of all geographers earned between \$10,000 and \$20,000 a year, according to a recent survey conducted by the Association of American Geographers. About one-fourth earned between \$20,000 and \$25,000, and a few more than \$25,000, in an academic year (9 months). (See statement on College and University Teachers elsewhere in the *Handbook*.) Geographers in educational institutions usually have an opportunity to earn income from other sources, such as consulting work, special research, and publication of books and articles.

Geographers in the Federal Government with the bachelor's degree and no experience started at \$7,694 or \$9,520 a year in early 1973, depending on their college records. Those with 1 or 2 years of graduate work started at \$9,520 or \$11,614 a year, and those with the Ph.D. at \$13,996.

Geographers earn about twice as much as the average earnings for non-supervisory workers in private industry, except farming.

Sources of Additional Information

Additional information on a career as a geographer is available from:

Association of American Geographers,
1710 16th St. NW., Washington,
D.C. 20009.

HISTORIANS

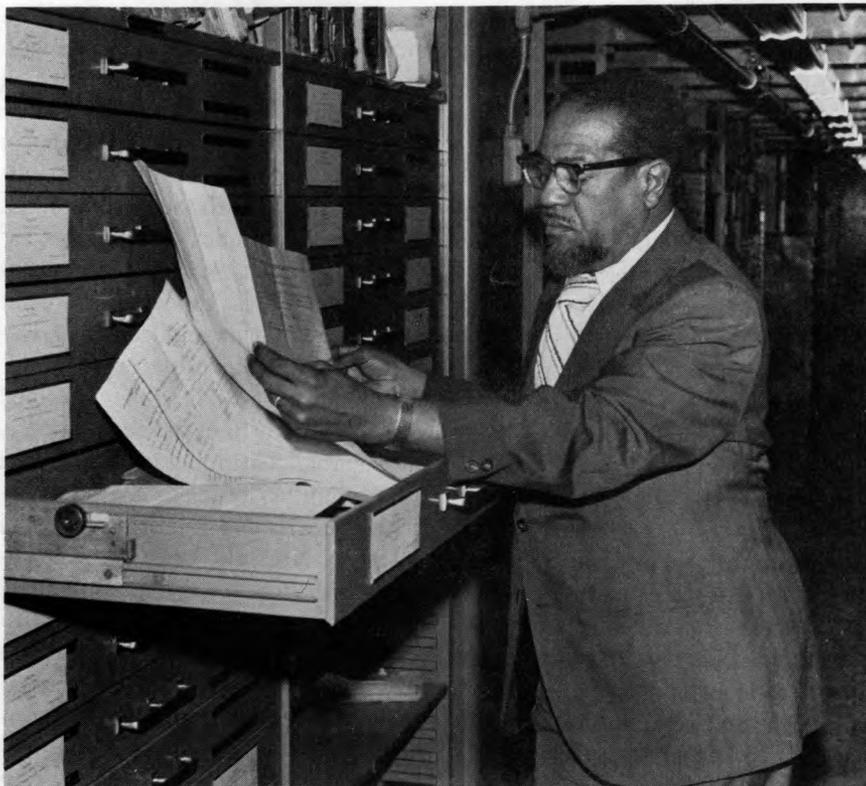
(D.O.T. 052.088)

Nature of the Work

History is the record of past events, institutions, ideas, and people. Historians describe and analyze the past through writing, teaching, and research. They relate their knowledge of the past to current events in an effort to explain the present.

Historians may specialize in the history of a specific country or area, or in a particular period of time—ancient, medieval, or modern. They may specialize, also in the history of a field, such as economics, culture, military affairs, the labor movement, art, or architecture. The number of specialties in history is constantly growing. Newer specialties are concerned with business archives, quantitative analysis, and the relationship between technological and other aspects of historical development. In this country, most historians still specialize in the political history of either the United States or modern Europe; however, a growing number now specialize in African, Latin American, Asian, or Near Eastern history. Some historians specialize in phases of a larger historical field. They may for example, study part of American history such as the Civil War.

Most historians are college teachers who not only lecture, but write and take part in research. Some are specialists called *archivists*, who identify or prepare exhibits, or who are spokesmen for museums, special libraries, and historical societies. A few serve as consultants to editors, publishers, and producers of materials for radio, television, and motion pictures. Some historians are researchers or administrators in government. They



Historian searches for information at National Archives.

prepare studies, articles, and books on their research findings.

Places of Employment

About 24,000 people worked as professional historians in 1972. More than 10 percent were women. Colleges and universities employ about three-fifths of all historians. Historians also work in archives, libraries, museums, junior colleges, secondary schools, research and editing organizations, and government. Historians employed in the Federal government work principally in the National Archives, and the Departments of Defense, Interior, and State. A small growing number work for State and local governments.

Since history is taught in all U.S. institutions of higher education, historians are found in college communities. Many of the historians in

the Federal Government are employed in Washington, D.C. Historians in other types of employment usually work in localities that have museums or libraries with collections adequate for historical research.

Training, Other Qualifications, and Advancement

Graduate education usually is necessary for employment as an historian. A master's degree in history is the minimum requirement for the position of college instructor. In many colleges and universities, however, a Ph.D. degree is essential for high-level teaching, research, and administrative positions. Most historians in the Federal Government and in nonprofit organizations have Ph.D. degrees, or their equivalent, in training and experience.

Although a bachelor's degree and a major in history is sufficient training for some beginning jobs in government—either Federal, State, or local—people in such jobs may not be regarded as professional historians. A knowledge of archival work is helpful, since beginning jobs are likely to be concerned with collection and preservation of historical data. For some jobs in international relations and journalism an undergraduate major in history is considered helpful.

Training for historians is available in many colleges and universities. Over 1,300 schools offer programs for the bachelor's degree, about 550 offered the master's and 115 offered doctorates.

History curriculums in the nation's colleges and universities are varied; however, each basically provides, in addition to history topics, training in research methods, writing, and speaking. These are the basic skills essential for historians in all positions in this field. Quantitative methods of analysis are becoming more important for historians and many college programs include them.

Historians spend a great deal of time studying, doing research, writing papers and reports, and giving lectures and presentations. In order to do these things well, they must be capable of communicating their ideas effectively, orally and in writing. The ability to work as part of a group, as well as independently is essential.

Employment Outlook

Employment of historians is expected to grow moderately through the mid-1980's. Historians will be needed to fill positions in colleges and universities, junior colleges, libraries, archives, museums, secondary schools, research and editorial

organizations, and government. Demand also will exist for people with training in historical specialties such as business history, as well as those who use quantitative methods in their research. In addition to jobs created by growth of the field, an even larger number of openings for historians each year over the projected period is expected to result from the need to replace those who retire, die, or leave the profession.

In contrast with the projected moderate growth of the occupation is a probable continuing rapid increase in the number of persons graduating with master's and doctoral degrees in history. Not all who receive advanced degrees in history, of course, represent new entrants to the profession. Although information is limited on patterns of entry to the field, if present trends in the number of persons studying for advanced degrees in history continue, the number of persons seeking to enter the field will likely exceed available positions. As a result, historians who have a Ph.D. are expected to face keen competition for the more desirable positions through the mid-1980's, especially for jobs in the academic community. Historians having only the master's degree will encounter very keen competition for jobs, but some teaching positions may be available in junior colleges or some high schools if they meet state certification requirements. People having only a bachelor's degree in history may be able to qualify as administrative and management trainees in government agencies, foundations, civic organizations, and private industry.

Earnings

Starting salaries for historians having a doctorate averaged nearly \$12,000 a year in 1972, according to limited information; master's degree holders have average starting salaries

of nearly \$10,000 a year. Salaries of historians in educational institutions averaged \$16,500 in 1972; in State and local governments, \$13,000; in nonprofit organizations, about \$16,000; and in private industry, nearly \$18,000 a year. The annual median salary for historians was more than \$14,000 in 1972. Historians earn about twice as much as the average earnings for nonsupervisory workers in private industry or private non-farm payrolls.

In the Federal Government, the starting salary for people having a bachelor's degree in history was \$7,694 in early 1973. Those who had a superior academic record or a year of graduate training were eligible to start at \$9,520. Experienced historians employed by the Federal Government in early 1973 earned between \$13,996 and \$26,898.

Some historians, particularly those in college teaching, supplement their income by summer teaching or writing books or articles. A few earn additional income from lectures.

Sources of Additional Information

Additional information on employment opportunities for historians is available from:

American Historical Association, 400
A St. SE., Washington, D.C.
20003.

POLITICAL SCIENTISTS

(D.O.T. 051.088)

Nature of the Work

Political scientists study governments—what they are, what they do, and how and why. Many of them specialize in a general area of political science including political theory,



Political scientist discussing Government operations with colleague.

U.S. political institutions and processes, comparative political institutions and processes, or international relations and organizations. Some specialize in a particular type of political institution or in the politics of a specific era.

Most political scientists are college and university teachers. They combine research, consultation, or administrative duties with teaching. Some are primarily researchers who survey public opinion on political questions for private research organizations, or study proposed legislation for Federal, State, and municipal governments, legislative reference bureaus or congressional committees. Others analyze the operations of government agencies or specialize in foreign affairs, research, either for government or non-government organizations. Some administer government programs.

Places of Employment

About 10,000 people worked as political scientists in 1972; ten per-

cent were women. About four-fifths work in colleges and universities. Most of the remainder work in government, research bureaus, civic and tax payers associations, and large business firms.

Political scientists can be found in nearly every college or university town since courses in government and political science are taught in almost all higher education curriculums. Some work overseas primarily for agencies of the U.S. Department of State, such as the Foreign Service, and the U.S. Agency for International Development. They also work for the U.S. Information Agency.

Training and Other Qualifications

Graduate training generally is required for employment as a political scientist. Completion of the requirements for the Ph.D. degree, except the doctoral dissertation, is the usual prerequisite for appointment as a college instructor. A Ph.D. degree is required for advancement to the position of assistant professor. The Ph.D. also is helpful for advancement in nonacademic areas.

College graduates having a master's degree can qualify for various administrative and research positions in government and in non-profit research or civic organizations. A master's degree in international relations, foreign service, and area study (for example, New England, government) is helpful in obtaining positions in Federal Government agencies concerned with foreign affairs.

People with only a bachelor's degree in political science may qualify as trainees in public relations, research, budget analysis, personnel, or investigation fields. Many students with bachelor's degrees in political science go on to study law or some specialized or related branch of

political science, such as public administration and international relations.

In 1972, more than 1,300 colleges and universities offered a bachelor's degree in political science, 268 had master's programs, and 115 had doctoral programs. Many colleges and universities offer field training and internships to gain experience in government work.

Undergraduate programs in political science vary throughout the Nation. A typical undergraduate curriculum in political science includes introductory politics, state and urban politics, comparative studies, political theory, foreign policy and public administration. An increasing number include courses in quantitative and statistical methods because of increased research emphasis in the field.

People planning careers as political scientists should like to work with details. They must be objective and able to work independently or as part of a team. Ability to express themselves clearly, orally and in writing, is important to political scientists, as they must communicate the results of their findings.

Employment Outlook

The number of persons who will graduate with advanced degrees in political science is likely to exceed available job openings. Those having a Ph.D. may face stiff competition finding choice academic positions. Master's degree holders are not likely to find positions as college and university instructors, but those having specialized training in areas such as policy analysis or public administration should have some opportunities in Federal, State and local government, research bureaus, political organizations and welfare agencies. New graduates having only the bachelor's degree are expected to

find very limited opportunities. However, for those planning to continue their studies in law, foreign affairs, journalism, and other related fields, a political science background is very helpful. Some who meet State certification requirements will be able to enter high school teaching.

Employment of political scientists is expected to increase moderately through the mid-1980's. The largest area of employment will continue to be in college and university teaching. In addition to those required to staff new positions, political scientists will be needed to fill positions vacated due to retirements, death or transfers.

Earnings

Beginning political scientists with a master's degree earned about \$9,000 a year in 1972 according to limited information; with doctoral degrees, about \$10,500.

According to limited information, the median salary of those who work in educational institutions was \$13,000 for an academic year, and \$16,800 for a calendar year. Political scientists in the Federal government averaged \$20,000 a year, and those in state and local government about \$17,000. Those employed in non-profit organizations and private industry and business had a median salary of more than \$19,000. Political scientists earn about twice as much as the average earnings for non-supervisory workers in private industry or private nonfarm payrolls.

In the Federal Government, the starting salary for political scientists having a bachelor's degree was about \$7,694 a year in early 1973. Those having a superior academic record or a year of graduate training were eligible to start at \$9,520.

Some political scientists, particu-

larly those in college teaching, supplement their income by teaching summer courses or consulting.

Sources of Additional Information

Additional information on employment opportunities in political science and public administration is available from:

American Political Science Association, 1527 New Hampshire Ave. NW., Washington, D.C. 20036.

SOCIOLOGISTS

(D.O.T. 054.088)

Nature of the Work

Sociologists study the groups that man forms in his association with others. These groups include families, tribes, communities, and governments, along with a variety of social, religious, political, business, and other organizations. They study the behavior and interaction of these groups; trace their origin and growth; and analyze the influence of group activities on individual members.

Some sociologists concern themselves primarily with the characteristics of social groups and institutions. Others are more interested in the ways individuals are affected by groups to which they belong.

Many sociologists specialize in social organization, social psychology, or rural sociology. Others specialize in intergroup relations, family problems, social effects of urban living, population studies, or analyses of public opinion. Some conduct surveys or concentrate on research

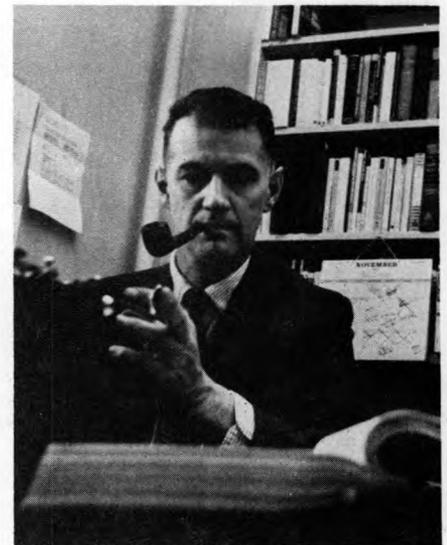
methods. Growing numbers apply sociological knowledge and methods in penology and correction, education, public relations in industry, and regional and community planning. A few specialize in medical sociology—the study of social factors that affect mental and public health.

Most sociologists are college and university teachers whose duties include both teaching and research. Sociological research involves the collection of information, preparation of case studies, testing, and the conduct of statistical surveys and laboratory experiments.

Sociologists also supervise research projects or the operation of social agencies such as family and marriage clinics. Others, acting as consultants, advise on diverse problems such as the management of hospitals for the mentally ill, the rehabilitation of juvenile delinquents, or the development of effective advertising programs to promote public interest in particular products such as television sets or cars.

Places of Employment

About 15,000 persons worked as



Sociologist working on manuscript for publication.

sociologists in 1972, more than one-seventh were women. Others work in positions that require training in this field but are not classified as professional sociologists. These fields include social, recreation, and public health work.

Colleges and universities employ about four-fifths of all sociologists. The remainder work for Federal, State, local, or international government agencies, in private industry, or in welfare or other nonprofit organizations, or else are self-employed.

Since sociology is taught in most institutions of higher learning, sociologists may be found in nearly all college communities. They are most heavily concentrated, however, in large colleges and universities which offer graduate training in sociology and opportunities for research.

Training, Other Qualifications, and Advancement

A master's degree and a major in sociology usually is the minimum requirement for employment as sociologist. The Ph.D. degree is an essential for attaining a professorship in most colleges or universities. It also is commonly required for directors of major research projects, important administrative positions, or consultants.

Sociologists having master's degrees, who are trained in research and statistical and computer methods can qualify for many administrative and research positions. Advancement to supervisory positions in both public and private agencies is gained through experience. Sociologists having a master's degree qualify for some college instructorships. Most colleges, however, appoint as instructors only people who have training beyond the master's level—frequently the completion of all requirements for the Ph.D. degree except the doctoral dis-

sertation. Outstanding graduate students often get teaching or research assistantships which provide both financial aid and valuable experience.

Bachelor's degree holders in sociology usually are not recognized by the profession as sociologists. However, they may, get jobs as interviewers or as research assistants. Many work as caseworkers, counselors, recreation workers, or administrative assistants in public and private welfare agencies. Sociology majors who have sufficient training in statistics may get positions as beginning statisticians. Those who meet State certification requirements can teach high school. About 900 colleges and universities offer bachelor degree programs; more than 200 offer master's degrees, and nearly 120 have doctorate programs.

The choice of a graduate school is important for people who want to become sociologists. Students interested in research should select schools that emphasize training in research, statistical, and computer methods. Opportunities to gain practical experience in research work may be available also. Professors and chairmen of sociology departments frequently aid in the placement of graduates.

Sociologists spend a great deal of their time in study and research. They must be able to communicate effectively, both orally and in writing, their ideas and findings. The ability to work as part of a group or independently is important.

Employment Outlook

Overall employment opportunities for sociologists who have a Ph.D. are expected to be favorable through the mid-1980's. However, those seeking choice academic positions may face some competition. Those having only a master's degree will probably continue to face considerable competition for academic positions, but

some jobs will be available in government and private industry. Sociologists well trained in research methods, advanced statistics and use of computer, will have the widest choice of jobs. Demand is expected to be strong for research personnel to work in the areas of rural sociology, community development, population analysis, public opinion research, medical sociology, and juvenile delinquency and education.

Employment of sociologists is expected to increase very rapidly through the mid-1980's. Most new positions will continue to be in college teaching. Some of these openings will result from the growing trend to include sociology courses in the curriculums of other professions, such as medicine, law, and education. Demand in the non-teaching area will center around public and private programs dealing with the development of human resources, particularly those designed to cope with social and welfare problems. In addition to growth needs, several hundred openings will occur each year to replace sociologists who die, retire, or leave the field for other reasons.

Earnings

In 1972, according to limited information, the average salary for sociologists was more than \$14,000 a year. Sociologists working in educational institutions on a calendar year basis averaged about \$16,500. Salaries ranged from \$11,500 for an assistant professor to \$36,000 for some heads of departments. Sociologists working in nonprofit organizations and private industry had average annual salaries of \$16,000 and \$18,000 respectively. Sociologists earn about twice as much as the average earnings for nonsupervisory workers in private industry or on private nonfarm payrolls.

In the Federal Government, the beginning salary for sociologists having a master's degree and a superior academic record was \$11,614 a year in early 1973. Salaries of experienced sociologists in the Federal Government generally ranged between \$13,996 and \$26,898 a year.

In general, sociologists having the

Ph.D. degree earn substantially higher salaries than those having master's degrees. Many sociologists, particularly those employed by colleges and universities for the academic year (September to June), are likely to supplement their regular salaries with earnings from other sources, such as summer teaching and consulting work.

Sources of Additional Information

Additional information on sociologists is available from:

The American Sociological Association, 1722 N St., NW., Washington, D.C. 20036.

(D.O.T. 045.108)

Nature of the Work

Workers in social service occupations help people adjust to problems in their daily lives. Depending on their specific occupation, they may advise consumers on how to get the most for their money; help handicapped people to achieve satisfactory lifestyles; counsel people with problems in their job, home, school, or social relationships; or treat people with moderate and severe psychological problems.

A genuine concern for all kinds of people is necessary for anyone considering a career in a social service occupation. Patience, tact, sensitivity, and a sense of humor along with compassion for others balanced with objectivity, are helpful personal qualities.

COUNSELING OCCUPATIONS

Professional counselors help people to understand themselves and their opportunities so that they can make and carry out decisions and plans for a satisfying and productive life. Whatever the area of counseling—personal, educational, or vocational—counselors must combine objectivity with genuine concern for each client. They must believe in the uniqueness and worth of each individual, in his right to make and accept responsibility for his own decisions, and in his potential for development.

This chapter covers four generally recognized specialties in the field: school counseling; rehabilitation counseling; employment counseling;

and college career planning and placement counseling.

School Counselors are the largest counseling group. Their main concern is the personal and social development of students and helping them plan and achieve their educational and vocational goals.

Rehabilitation Counselors work with persons who are physically, mentally, or socially handicapped. Their counseling is generally job-oriented, but also involves personal counseling.

Employment Counselors are mainly concerned with career planning and adjustment of young, old, able-bodied, and disabled persons.

College Career Planning and Placement Counselors help college students examine their own interests, abilities, and goals; explore career alternatives; and make and follow through with a career choice.

Persons who want to enter the counseling field must be interested in helping people and have an ability to understand their behavior. A pleasant but strong personality that instills confidence in clients is desirable in counselors. They also must be patient, sensitive to the needs of others, and able to communicate orally as well as in writing.

Many psychologists, social workers, and college student personnel workers also do counseling. The occupation most closely related to counselor is that of the counseling psychologist. Other professional workers who do some counseling but primarily work in teaching, health, law, religion, personnel, or other fields, are described elsewhere in the *Handbook*.

School counselors are concerned about the educational, career, and social development of students. They work with students, both individually and in groups, as well as with teachers, other school personnel, parents, and community agencies.

Counselors use the results of interest, achievement, and intelligence tests as well as school and other records to help students evaluate themselves. Then, with each student and sometimes with the parents, they help develop an educational plan that fits the student's abilities, interests, and career aspirations.

Many high school counselors help students individually with personal and social problems. They also may lead group counseling sessions and discussion groups on topics related to student interests and problems.

School counselors often maintain a small library containing occupational literature so that students may find descriptions of work that they have heard about or in which they have shown an interest. Information on training requirements, earnings and employment outlook often are included with these job descriptions. Computers that students can operate are being experimented with in this area.

Counselors sometimes arrange trips to factories and business firms, and show vocational films to provide a view of real work settings. To bring the workplace into the school, the counselor may conduct "career day" programs.

School counselors must keep up-to-date on opportunities for educational and vocational training beyond high school to counsel students who want this information. They



must keep informed about training programs in 2- and 4-year colleges; in trade, technical and business schools; apprenticeship programs; and available federally supported programs. Counselors also advise students about educational requirements for entry-level jobs, job changes caused by automation and other technological advances, college entrance requirements and places of employment.

Counselors in high schools often help students find part-time jobs, either to enable them to stay in school, or to help them prepare for their vocation. They may assist students leaving school before or after graduating to find jobs or may direct them to community employment services. They also may participate in follow-up studies of graduates and dropouts, conduct surveys of local job opportunities, or determine the effectiveness of the educational and guidance programs.

Elementary school counselors help children to make the best use of their abilities by identifying these and

other basic aspects of the child's makeup at an early age, and by evaluating any learning problems. Methods used in counseling grade school children differ in many ways from those used with older students. Observations of classroom and play activity furnish clues about children in the lower grades. To better understand children, elementary school counselors spend much time consulting with teachers and parents. They also work closely with other staff members of the school, including psychologists and social workers.

Some school counselors, particularly in secondary schools, teach classes in occupational information, social studies, or other subjects. They also may supervise school clubs or other extracurricular activities, often after regular school hours.

Places of Employment

About 43,000 people worked full-time as public school counselors during the 1971-72 school year. More than 10 percent of them worked in el-

ementary schools.

Most counselors work in large schools. An increasing number of school districts, however, provide guidance services to their small schools by assigning more than one school to a counselor.

For the most part, counselors who work in junior high schools and especially in elementary schools are women; in high schools the majority of the counselors are men. However positions at both levels are equally available to men and women.

Training, Other Qualifications, and Advancement

Most States require school counselors to have counseling and teaching certificates. (See statements on Elementary and Secondary School Teachers for certificate requirements.) Depending on the State, graduate work and from 1 to 5 years of teaching experience usually are required for a counseling certificate. People who plan to become counselors should learn the requirements of the State in which they plan to work, since requirements vary among States and change rapidly.

College students interested in becoming school counselors usually take the regular program of teacher education, with additional courses in psychology and sociology. In States where teaching experience is not a requirement, it is possible to major in a liberal arts program. A few States substitute counseling internship for teaching experience. In some States, teachers who have completed part of the courses required for the master's degree are eligible for provisional certification and may work as counselors under supervision while they take additional courses.

Counselor education programs at the graduate level are available in more than 370 colleges and universities, most frequently in the departments of education or psychology.

One to two years of graduate study are necessary for a master's degree. Most programs provide supervised field experience.

Subject areas of required graduate-level courses usually include appraisal of the individual student, individual counseling procedures, group guidance, information services for career development, professional relations and ethics, and statistics and research.

The ability to help others accept personal responsibility for their own lives is important for school counselors since they work with the development of young people. They must be able to coordinate the activity of others and work as part of the team which forms the educational system.

School counselors traditionally began as teachers and advanced to principal. However, in recent years, the trend is either to remain a counselor, possibly moving to a larger school; to advance to become director or supervisor of counseling or guidance; or, with further graduate education, to advance to become a college counselor, educational psychologist, or school psychologist.

Employment Outlook

Employment opportunities for well-trained school counselors are expected to be favorable through the mid-1980's. Over the long run, demand for school counselors will be due in large part to the impact of the Federal Government's Career Education program. This program is designed to inform children about the world of work early in their education, so that by the time they leave the formal education system they are prepared for a suitable and available career. In addition to the expected expansion of the occupation, many counselors will be required each year

to replace those who leave the profession.

Employment of school counselors is likely to grow only moderately through most of the remainder of the 1970's as the decline in school enrollments continues. An expected upswing in enrollments beginning in the late 1970's should stimulate a more rapid growth in counselor employment through the mid-1980's. In 1972, the average ratio of counselors to students as a whole was still well below generally accepted standards despite Federal aid to the States for support and expansion of counseling programs. Some school systems were forced to eliminate some counselor positions due to local financial problems. The extent of future growth in counselor employment will depend largely on the amount of funds which the Federal Government provides to the States for this purpose.

Earnings and Working Conditions

School counselors holding bachelor's degrees earned average annual salaries ranging from \$7,900 to \$11,400 during the 1971-72 school year, according to the National Education Association. For those having master's degrees, average yearly salaries were from \$9,000 to \$13,400. School counselors with doctorate's had an average maximum salary of almost \$16,000 per year. School counselors generally earn more than teachers at the same school. (See statements on Kindergarten and Elementary School Teachers and Secondary School Teachers.)

In most school systems, counselors receive regular salary increments as they obtain additional education and experience. Some counselors supplement their income by part-time consulting or other work

with private or public counseling centers, government agencies, or private industry.

Sources of Additional Information

State Departments of Education can supply information on colleges and universities that offer training in guidance and counseling as well as on the State certification requirements.

Additional information on this field of work is available from:

American School Counselor Association, 1607 New Hampshire Ave. NW., Washington, D.C. 20009.

EMPLOYMENT COUNSELORS

(D.O.T. 045.108)

Nature of the Work

Employment counselors (sometimes called vocational counselors) help jobseekers evaluate their abilities and interests so that they can choose, prepare for, and adjust to a satisfactory field of work. The extent of counseling services given by employment counselors varies, depending on the jobseeker and the type of agency. Jobseekers may include veterans, youth with little or no work experience, the handicapped, older workers, and individuals displaced by automation and industry shifts, or unhappy with their present occupational fields. Sometimes jobseekers are skilled in specific occupations and ready for immediate job placement, while those who have little education and lack marketable skills need intensive training to prepare them for jobs. In State employment services, the counselor is also concerned with helping those who are least employable, such as wel-



fare recipients, prison releasees, and the educationally and culturally deprived.

Counselors interview jobseekers to learn employment-related facts about their interests, training, work experience, work attitudes, physical capacities, and personal traits. If necessary, they may get additional data by arranging for aptitude and achievement tests, and interest inventories, so that more objective help may be given. They may get additional information from sources such as former employers and schools.

When the jobseeker's background—his limitations and abilities—have been thoroughly reviewed, the employment counselor discusses occupational requirements and job opportunities in different fields within the potential of the jobseeker. Then, the counselor and his client develop a vocational plan. This plan may specify a series of steps involving remedial education, job training, work experience, or other services needed to enhance the person's employability. Often, in de-

veloping this plan, the employment counselor works with a team of specialists.

In many cases, employment counselors refer jobseekers to other agencies for physical rehabilitation or psychological or other services before or during counseling. The counselor must be familiar with the available community services so that he can select those most likely to benefit a particular jobseeker.

Counselors may help jobseekers by suggesting employment sources and appropriate ways of applying for work. In many cases when further support and assistance are needed, counselors may contact employers to develop jobs for counseled applicants, although jobseekers usually are sent to placement interviewers after counseling. After job placement or entrance into training, counselors may follow up to determine if additional assistance is needed.

The expanding responsibility of public employment service counselors for improving the employability of disadvantaged persons has in-

creased their contacts with these persons during training and on the job. Also, it has led to group counseling and the stationing of counselors in neighborhood and community centers.

Places of Employment

In 1972, about 6,000 persons, half of them women, worked as employment counselors in State employment service offices, located in every large city and many smaller towns. In addition, about 2,500 employment counselors worked for various private or community agencies, primarily in the larger cities. Some worked in institutions such as prisons, training schools for delinquent youths, and mental hospitals. Also, the Federal Government employed a limited number of employment counselors, chiefly in the Veterans Administration and in the Bureau of Indian Affairs. Some counselors teach in graduate training programs or conduct research.

Training, Other Qualifications, and Advancement

The national qualification standard for first level employment counselors in State employment service offices calls for 30 graduate semester hours of counseling courses beyond a bachelor's degree. However, 1 year of counseling-related experience may be substituted for 15 graduate semester hours.

All States require counselors in their public employment offices to meet State civil service or merit system requirements that include minimum educational and experience standards.

Applicants with advanced degrees and additional qualifying experience may enter at higher levels on the counselor career ladder. Many States also make provision for indi-

viduals with extensive experience in the Employment Service, whether or not they have college degrees, to enter the counselor career ladder and move upward by acquiring the prescribed university coursework and qualifying experience for each level.

Although minimum entrance requirements are not standardized among private and community agencies, most prefer, and some require, a master's degree in vocational counseling or in a related field such as psychology, personnel administration, counseling, guidance education, or public administration. Many private agencies prefer to have at least one staff member who has a doctorate in counseling psychology or a related field. For those lacking an advanced degree, employers usually emphasize experience in closely related work such as rehabilitation counseling, employment interviewing, school or college counseling, teaching, social work or psychology.

In each State, the public employment service offices provide some inservice training programs for their new counselors or trainees. In addition, both their new and experienced counselors are often given part-time training at colleges and universities during the regular academic year or at institutes or summer sessions. Private and community agencies also often provide inservice training opportunities.

College students who wish to become employment counselors should enroll especially in courses in psychology and basic sociology. At the graduate level, requirements for this field usually include courses in techniques of counseling, psychological principles and psychology of careers, assessment and appraisal, cultures and environment, and occupational information. Counselor education programs at the graduate level are available in about 370 colleges and universities, mainly in departments

of education or psychology. To obtain a master's degree, students must complete 1 to 2 years of graduate study.

Young people aspiring to be employment counselors should have a strong interest in helping others make vocational plans and carry them out. They should be able to work independently and keep detailed records.

Well-qualified counselors with experience may advance to supervisory or administrative positions in their own or other organizations. Some may become directors of agencies or of other counseling services, or area supervisors of guidance programs; some may become consultants; and others may become professors in the counseling field.

Employment Outlook

Employment counselors with master's degrees, and others with experience in related fields are expected to have favorable employment opportunities in both public and community employment agencies through the mid-1980's. Some of these openings will be due to deaths, retirements and transfers to other occupations.

Demand for employment counselors should increase as their role becomes more important in programs dealing with the training and retraining of unemployed workers, particularly those who are unskilled or whose jobs have been displaced by technology or industry shifts. Stimulating this demand is growing public recognition that more effort and services are needed if people with limited skills are to be able to find satisfactory jobs. Expansion of these programs and consequently the extent of growth in employment of counselors will depend in large part on the level of funding by the Federal Government, as well as on the distri-

bution of revenue sharing monies allocated to these types of programs by the individual States.

Earnings and Working Conditions

Salaries of employment counselors in State employment services vary considerably by State. In 1972, minimum salaries ranged from about \$6,900 to \$13,000 a year with an average of \$8,300. Maximum salaries ranged from \$8,900 to \$15,800 with an average of \$10,700. More than one-half of the States listed maximum salaries of \$10,000 or over. Trainees for counseling positions in some voluntary agencies in large cities were being hired at about \$7,500 a year. Salaries of some employment counselors in private and community agencies were as high as \$20,000, although the average was about \$10,000 annually. In general, salaries of employment counselors are about one and one-half times as high as average earnings for non-supervisory workers in private industry, except farming.

Most counselors work about 40 hours a week and have various benefits, including vacations, sick leave, pension plans, and insurance coverage. Counselors employed in community agencies may work overtime.

Sources of Additional Information

For general information on employment or vocational counseling, contact:

National Employment Counselors Association, 1607 New Hampshire Ave. NW., Washington, D.C. 20009.

National Vocational Guidance Association, Inc., 1607 New Hampshire Ave. NW., Washington, D.C. 20009.

U.S. Department of Labor, Manpower Administration, USES, Division of Counseling and Testing, Washington, D.C. 20210.

The administrative office for each State's employment security agency, bureau, division, or commission can supply specific information about local job opportunities, salaries, and entrance requirements for positions in public employment service offices.

REHABILITATION COUNSELORS

(D.O.T. 045.108)

Nature of the Work

Rehabilitation counselors help people with physical, mental, or social disabilities to adjust their vocational plans and personal lives. In the initial contact with a client, the counselor learns about his interests and abilities, as well as his limitations. The counselor then uses this information, along with available medical and psychological data, to help the disabled person to evaluate himself—his physical and mental capacity and interests—in relation to suitable work.

Together, the counselor and client develop a plan of rehabilitation with the aid of other specialists responsible for the medical care and occupational training of the handicapped person. As the plan is put into effect, the counselor meets regularly with the disabled person to discuss his progress in the rehabilitation program and help resolve any problems that have been encountered. When the client is ready to begin work, the counselor helps him find a suitable job, and usually makes followup checks to insure that the placement has been successful.

Rehabilitation counselors must maintain close contact with the fam-



Rehabilitation counselor leads group counseling session with alcoholics.

ilies of their handicapped clients, other professionals who work with handicapped people, agencies and civic groups, and private employers who hire the disabled. Counselors in this field often perform related activities, such as informing employers of the abilities of the handicapped and arranging for publicity of the rehabilitation program in the community.

An increasing number of counselors specialize in a particular area of rehabilitation; some may work almost exclusively with blind people, alcoholics or drug addicts, the mentally ill, or retarded persons. Others may work almost entirely with persons living in poverty areas.

The amount of time spent in counseling each client varies with the severity of the disabled person's problems as well as with the size of the counselor's caseload. Some rehabilitation counselors are responsible for

many persons in various stages of rehabilitation; on the other hand, less experienced counselors or those working with the severely disabled may work with relatively few cases at a time.

Places of Employment

About 16,000 persons, one-third of them women, worked as rehabilitation counselors in 1972. About three-fourths worked in State and local rehabilitation agencies financed cooperatively with Federal and State funds. About 800 rehabilitation counselors and counseling psychologists worked for the Veterans Administration. Rehabilitation centers, sheltered workshops, hospitals, labor unions, insurance companies, special schools, and other public and private agencies with rehabilitation programs and job placement services for the disabled employ the rest.

Training, Other Qualifications, and Advancement

A bachelor's degree with courses in counseling, psychology, and related fields is the minimum educational requirement for rehabilitation counselors. However, employers are placing increasing emphasis on the master's degree in vocational counseling or rehabilitation counseling, or in related subjects such as psychology, education, and social work. Work experience in fields such as vocational counseling and placement, psychology, education, and social work is an asset for securing employment as a rehabilitation counselor. Most agencies have work-study programs whereby employed counselors can earn graduate degrees in the field.

Usually, 2 years of study are required for the master's degree in the fields preferred for rehabilitation counseling. In addition to a basic foundation in psychology, courses generally included in master's degree programs are counseling theory and techniques, occupational and educational information, and community resources. Other requirements may include courses in placement and followup, tests and measurements, cultural and psychological effects of disability, and medical and legislative aspects of therapy and rehabilitation.

To earn the doctorate in rehabilitation counseling or in counseling psychology may require a total of 4 to 6 years of graduate study. Intensive training in psychology and other social sciences, as well as research methods is required.

Many States require that rehabilitation counselors be hired in accordance with State civil service and merit system rules. In most cases, these regulations require applicants to pass a competitive written test, sometimes supplemented by an

individual interview and evaluation by a board of examiners.

Since rehabilitation counselors deal with the welfare of individuals who may otherwise be unemployed, the ability to accept responsibility is important. It also is essential that they be able to work independently and be able to motivate and guide the activity of others.

Counselors who have limited experience usually are assigned the less difficult cases. As they gain experience, their caseloads are increased and they are assigned clients with more complex rehabilitation problems. After obtaining considerable experience and more graduate education, rehabilitation counselors may be advanced to supervisory positions or top administrative jobs.

Employment Outlook

Employment opportunities for rehabilitation counselors are expected to be favorable through the mid-1980's. Persons who have graduate work in rehabilitation counseling or in related fields are expected to have the best employment prospects.

Contributing to the long run demand for rehabilitation counselors will be population growth with related increases in the number of people who need to be served. Stimulating this demand will be the extension of service to a greater number of the severely disabled, together with increased public awareness that the vocational rehabilitation approach helps the disabled to become self-supporting. The extent of growth in employment of counselors, however, will depend largely on levels of government funding for vocational rehabilitation. In addition to growth needs, many counselors will be required annually to replace those who die, retire, or leave the field for other reasons.

Earnings and Working Conditions

Salaries of beginning rehabilitation counselors in State agencies averaged \$8,700 a year in 1972. Experienced counselors earned average salaries of \$11,500 a year; the range was \$9,700 to \$15,700 among the States.

The Veterans Administration paid counseling psychologists with a two-year master's degree and one year of subsequent experience—and those with a Ph.D.—starting salaries of \$14,000 in early 1973. Those with a Ph.D. and a year of experience, and those with a 2-year master's degree and much experience, started at \$16,700. Some rehabilitation counselors with a bachelor's degree were hired at starting salaries of \$9,500 and \$11,600. In general, salaries of employment counselors are above the average earnings for nonsupervisory workers in private industry, except farming.

Counselors may spend only part of their time in their offices counseling and performing necessary paperwork. The remainder of their time is spent in the field, working with prospective employers, training agencies, and the disabled person's family. The ability to drive a car often is necessary for field work.

Rehabilitation counselors generally work a 40-hour week or less, with some overtime work required, since, they often must attend community and civic meetings in the evenings. They usually are covered by sick and annual leave benefits, and pension and health plans.

Sources of Additional Information

For information about rehabilitation counseling as a career, contact:

American Psychological Association, Inc., 1200 17th St. NW., Washington, D.C. 20036.

American Rehabilitation Counseling Association, 1607 New Hampshire Ave. NW., Washington, D.C. 20009.

National Rehabilitation Counseling Association, 1522 K St. NW., Washington, D.C. 20005.

COLLEGE CAREER PLANNING AND PLACEMENT COUNSELORS

(D.O.T. 166.268)

Nature of the Work

Choosing a career and deciding whether or not to go to graduate school are among the difficult decisions faced by many college students. Career planning and placement counselors are employed by colleges to offer encouragement and assist in these decisions.

Career planning and placement counselors, sometimes called college placement officers, provide a variety of services to college students and alumni. They assist students in making career selections by encouraging them to examine their interests, abilities, and goals, and then aiding them in exploring possible career alternatives and choosing an occupational area that is best suited to their individual needs. They advise students considering dropping out of the opportunities open to them. They also help students to get part-time and summer jobs.

Career planning and placement counselors arrange for job recruiters to visit the campus to discuss their firm's personnel needs and to interview applicants. They provide employers with information about

students and help in appraising students' qualifications. They must keep abreast of information concerning job market developments in order to contact prospective employers, help students prepare for promising fields, and encourage the faculty and school administration to provide pertinent courses. Many counselors also assemble and maintain a library of career guidance information and recruitment literature.

Placement counselors may specialize in areas such as law, education, or part-time and summer work. However, the extent of specialization usually depends upon the size and type of college as well as the size of the placement staff.

Places of Employment

Nearly all 4-year colleges and universities and many of the increasing number of junior colleges provide career planning and placement services to their students and alumni. Large colleges may employ several counselors working under a director of career planning and placement activities; in many institutions, however, a combination of placement functions is performed by one director and his clerical staff. In some col-

leges, especially the smaller ones, the functions of career counselors may be performed on a part-time basis by members of the faculty or administrative staff. Universities frequently have placement officers for each major branch or campus.

About 3,800 persons, one-third of them women, worked as career planning and placement counselors in 1972. Most of those in four-year schools were employed on a full-time basis. Of the 1,000 in junior colleges, about two-thirds worked part-time.

Training, Other Qualifications, and Advancement

Although no specific educational program exists to prepare persons for career planning and placement work, a bachelor's degree, preferably in a behavioral science such as psychology or sociology, is customary for entry into the field and a master's degree is increasingly being stressed.

In 1972, more than 100 colleges and universities offered graduate programs in college student personnel work. Graduate courses that are helpful for career planning and placement counseling include counseling theory and techniques, vocational testing, theory of group dynamics, and occupational research and employment trends.

Some people enter the career planning and placement field after gaining a broad background of experience in business, industry, government, or educational organizations. An internship in a career planning and placement office also is helpful.

College career planning and placement counselors must have an interest in people. They must be able to communicate with and gain the confidence of students, faculty, and employers in order to develop insight into the employment problems



College career planning and placement counselor discusses career alternatives with college student.

of both employers and students. People in this field should be energetic and able to work under pressure, since they must organize and administer a wide variety of activities.

Advancement for career planning and placement professionals usually is through promotion to an assistant or associate position, director of career planning and placement, director of student personnel services, or some other higher level administrative position. However, the extent of such opportunity usually depends upon the type of college or university and the size of the staff.

Employment Outlook

The overall employment outlook for well-qualified college career planning and placement counselors is expected to be favorable through the mid-1980's. College enrollments are expected to continue increasing through the early 1980's, a factor which is likely to contribute to a moderate growth of employment in this field. Demand will be greatest in junior and community colleges, where enrollment increases are projected to be very rapid and where, in many cases, there are no career

counseling and placement programs at present. Also contributing to the demand will be expected continued expansion in services to students from minority and low-income groups, who require special counseling in choosing careers, and assistance in finding part-time jobs to help pay for their education.

However, many institutions of higher education faced financial problems in 1972. If this situation persists into the mid-1970's, colleges and universities may be forced to limit expansion of counseling and placement services, resulting in competition for available positions in this field during this period.

Earnings and Working Conditions

The median salary of college career planning and placement counselors was more than \$13,000 a year in 1972, according to a National Education Association survey of public and private colleges and universities. Median salaries in large public universities ranged from about \$15,000 to \$19,000; in small private colleges, from \$7,000 to \$10,000. In general, salaries of college

career planning and placement counselors are about twice as high as average earnings for non-supervisory workers in private industry except farming.

Career planning and placement counselors frequently work more than a 40-hour week; irregular hours and overtime often are necessary, particularly during the "recruiting season." Most counselors are employed on a 12-month basis. They are paid for holidays and vacations and usually receive the same benefits as other professional personnel employed by colleges and universities.

Sources of Additional Information

A list of schools that offer courses in career counseling and placement and a booklet on the college student personnel professions, as well as other information on career counseling and placement, are available from:

The College Placement Council, Inc.,
P.O. Box 2263, Bethlehem, Pa.
18001.

CLERGYMEN

Deciding to become a clergyman involves considerations different from those involved in another career choice. When young persons choose to enter the ministry, priesthood, or rabbinate, they do so primarily because they possess a strong religious faith and a desire to help others.

Nevertheless, it is important for the young to know as much as possible about the profession and how to prepare for it, the kind of life it offers, and its needs for personnel.

The number of clergymen needed is related to the size and the geographic distribution of the Nation's population and its participation in organized religious groups. These factors affect the numbers of churches and synagogues established and of pulpits to be filled. In addition to the clergy who serve congregations, many others teach or act as administrators in seminaries and in other educational institutions; still others serve as chaplains in the Armed Forces, industry, correctional institutions, hospitals or on college campuses; or render service as missionaries, or in social welfare agencies.

A young person considering a career as a clergyman should seek the counsel of a religious leader of his faith to aid in evaluating his qualifications. The desire to serve the spiritual needs of others and a deep religious belief are the most important qualifications. To deal effectively with all types of people, clergymen need to be well-rounded both educationally and socially, and able to speak and write effectively. They should have emotional stability, as well as a sensitivity to other people's problems, and should also be able to motivate people. Some supervisory ability is important since they must

direct the activities and business of church or synagogue. Clergymen should have initiative, self-discipline, and the ability to organize. They also should enjoy studying, because the ministry is an occupation that requires continuous learning. Clergymen are expected to be models of high moral and ethical standards for the whole community. Also, young persons considering this field should realize that the civic, social, and recreational activities of clergymen often are influenced and restricted by the customs and attitudes of the community.

To a large extent, the size and financial status of the congregation determines income. Usually, pay is highest in large cities or in prosperous suburban areas. Earnings usually rise with increased experience and responsibility.

Various additions to income have been traditional, as well. Most Protestant churches and a number of Jewish congregations provide housing. Roman Catholic priests ordinarily live in the parish rectory or in housing their religious order provides. Many clergymen receive transportation allowances or payment of other expenses. Gifts or fees for officiating at special ceremonies, such as weddings, may be an important source of additional income; however, clergymen frequently donate such earnings to charity. Some churches establish a uniform fee for special services which goes directly into the church treasury.

More detailed information on the clergy in the three largest faiths in the United States—Protestant, Roman Catholic, and Jewish—is given in the following statements, prepared in cooperation with leaders of these faiths. Information on the clergy in other faiths may be obtained directly from leaders of the respective groups.

PROTESTANT MINISTERS

(D.O.T. 120.108)

Protestant ministers lead their congregations in worship services and administer the rites of baptism, confirmation, and Holy Communion. They prepare and deliver sermons, and give religious instructions to persons who are to become new members of the church. They also perform marriages; conduct funerals; counsel individuals who seek guidance; visit the sick, aged, and handicapped at home and in the hospital; comfort the bereaved; and serve church members in other helpful ways. Many Protestant ministers write articles for publication, give speeches, and engage in interfaith, community, civic, educational, and recreational activities sponsored by or related to the interests of the church. Some ministers teach in seminaries, colleges, and universities.

The services that ministers conduct differ among Protestant denominations and also among congregations within a denomination. In many denominations, ministers follow a traditional order of worship; in



others they adapt the services to the needs of youth and other groups within the congregation. Most services include Bible reading, hymn singing, prayers, and a sermon. In some denominations, Bible reading by a member of the congregation and individual testimonials may constitute a large part of the service.

Ministers serving small congregations generally work on a personal basis with their parishioners. Those serving large congregations have greater administrative responsibilities, and spend considerable time working with committees, church officers, and staff, besides performing their other duties. They may have one or more associates or assistants who share specific aspects of the ministry, such as a Minister of Education who assists in educational programs for different age groups, or a Minister of Music.

Places of Employment

In 1972, about 325,000 ministers—about 5 percent of them women—served 72 million Protestants. In addition, thousands of ministers were in closely related occupations. Most ministers, however, serve individual congregations. The greatest number of clergymen are affiliated with the five largest groups of churches—Baptist, United Methodist, Lutheran, Presbyterian, and Episcopal.

All cities and most towns in the United States have at least one Protestant church with a full-time minister. Although the majority of ministers are located in urban areas, many live in less densely populated areas where they may serve two or more congregations.

Training and Qualifications

Educational requirements for entry into the Protestant ministry vary

greatly. Some denominations have no formal educational requirements, and others ordain persons having varying amounts and types of training in Bible colleges, Bible institutes, or liberal arts colleges. A large number of denominations require a 3-year course of professional study in a theological school or seminary following college graduation. A degree of bachelor or master of divinity is awarded upon completion.

In 1972, there were 128 theological institutes accredited by the American Association of Theological Schools. These institutions admit only students who have received a bachelor's degree or its equivalent from an accredited college.

Recommended pre-seminary courses include English, history, philosophy, the natural sciences, social sciences, the fine arts, music, religion, and foreign languages. However, the student considering theological study should contact, at the earliest possible date, the school or schools to which he intends to apply, in order to learn what will best prepare him for the program he expects to enter.

The standard curriculum recommended for accredited theological schools consists of courses in four major fields: Biblical, historical, theological, and practical. In recent years, greater emphasis has been placed on courses of a practical nature such as psychology, religious education, and administration. Many accredited schools require that students gain experience in church work under the supervision of a faculty member or experienced minister. Some institutions offer master of theology and doctor of theology degrees to students completing one year or more of additional study. Scholarships and loans are available for students of theological institutes.

In general, each large denomina-

tion has its own school or schools of theology that reflect its particular doctrine, interests, and needs; however, many of these schools are open to students from other denominations. Several interdenominational schools associated with universities give both undergraduate and graduate training covering a wide range of theological points of view.

Persons who have denominational qualifications for the ministry usually are ordained following graduation from a seminary. In denominations that do not require seminary training, clergymen are ordained at various appointed times. Clergymen often begin their careers as pastors of small congregations or as assistant pastors in large churches.

Outlook

The shortage of Protestant ministers has abated significantly in recent years, with a marked reduction in demand for Protestant ministers who serve individual congregations. Causes have been the trend toward merger and unity among denominations, combined with the closing of smaller parishes, and the downturn in financial support. If this trend continues, new graduates of theological schools may face increasing competition in finding positions. The supply-demand situation will vary among denominations and depend, in part, on the length of the candidate's formal preparation. Most of the openings for clergymen that are expected through the mid-1980's will therefore result from the need to replace those in existing positions who retire, die, or leave the ministry.

Although fewer opportunities may arise for Protestant ministers to serve individual congregations, newly ordained ministers may find work in youth, family relations, and welfare organizations; religious education; on the campus; and as chap-

lains in the Armed Forces, hospitals, universities, and correctional institutions.

Sources of Additional Information

Persons who are interested in the Protestant ministry should seek the counsel of a minister or church guidance workers. Additional information on the ministry is available from many denominational offices. Each theological school can supply information on admission requirements.

RABBIS

(D.O.T. 120.108)

Nature of Work

Rabbis are the spiritual leaders of their congregations and teachers and interpreters of Jewish law and tradition. They conduct daily services and deliver sermons at services on the Sabbath and on Jewish holidays. Rabbis customarily are available at all times to counsel members of their congregation, other followers of Judaism, and the community at large. Like other clergymen, rabbis conduct weddings and funeral services, visit the sick, help the poor, comfort the bereaved, supervise religious education programs, engage in interfaith activities, and involve themselves in community affairs.

Rabbis serving large congregations may spend considerable time in administrative duties, working with their staffs and committees. Large congregations frequently have an associate or assistant rabbi. Many assistant rabbis serve as Educational Directors.

Rabbis serve either Orthodox, Conservative, or Reform congregations.

Regardless of their particular point of view, all Hebrew congregations preserve the substance of Jewish religious worship. The congregations differ in the extent to which they follow the traditional form of worship—for example, in the wearing of head coverings, the use of Hebrew as the language of prayer, or the use of music or a choir. The format of the worship service and, therefore, the ritual that the rabbis use may vary even among congregations belonging to the same branch of Judaism.

Rabbis also may write for religious and lay publications, and teach in theological seminaries, colleges, and universities.

Places of Employment

More than 5,800 rabbis served nearly 5.9 million followers of the Jewish faith in this country in 1972. Most are Orthodox rabbis; the rest are about equally divided between Conservative and Reform congregations. The majority of rabbis are the spiritual leaders of individual congregations. The others are engaged in other activities mentioned in the introduction to this section, except for missionary work, which never has been a tradition of Judaism.

Although rabbis serve Jewish communities throughout the Nation, they are concentrated in those States that have large Jewish populations, particularly New York, California, Pennsylvania, New Jersey, Illinois, Massachusetts, Florida, Maryland, and the Washington, D.C. metropolitan area.

Training, and Other Qualifications

To become eligible for ordination as a rabbi, a student must complete the prescribed course of study. En-



trance requirements and the curriculum depend upon the branch of Judaism with which the seminary is associated.

Nearly 30 seminaries train Orthodox rabbis in programs of varying lengths. Two of the larger seminaries require the completion of a 4-year college course for ordination. However, students who are not college graduates may spend a longer period at these seminaries and complete the requirements for the bachelor's degree while pursuing the rabbinic course. The other Orthodox seminaries do not require a college degree to qualify for ordination, although students who qualify usually have completed 4 years of college.

The Hebrew Union College—Jewish Institute of Religion is the official seminary that trains rabbis for the Reform branch of Judaism. The Jewish Theological Seminary of America is the official seminary that trains rabbis for the Conservative branch of Judaism. Both seminaries require the completion of a 4-year college course, as well as earlier preparation in Jewish studies, for admission to the rabbinic program leading to ordination. Normally five years of study are re-

quired to complete the rabbinic course at the Reform seminary, including one year of preparatory study in Jerusalem. Exceptionally well-prepared students can shorten this 5-year period to a minimum of three years. A student having a strong background in Jewish studies can complete the course at the Conservative seminary in four years; for other enrollees, the course may take as long as six.

In general, the curriculums of Jewish theological seminaries provide students with a comprehensive knowledge of the Bible, Talmud, Rabbinic literature, Jewish history, theology, and courses in education, pastoral psychology, and public speaking. The Reform seminary places less emphasis on the study of Talmud and Rabbinic literature; it offers, instead, a broad course of study that includes subjects such as human relations and community organization.

Some seminaries grant advanced academic degrees in fields such as Biblical and Talmudic research. All Jewish theological seminaries make scholarships and loans available.

Newly ordained rabbis usually begin as leaders of small congregations, assistants to experienced rabbis, directors of Hillel Foundations, teachers in seminaries and other educational institutions, or chaplains in the Armed Forces. As a rule, the pulpits of large and well-established Jewish congregations are filled by experienced rabbis.

Outlook

In 1972, the number of rabbis in this country was inadequate to meet the expanding needs of Jewish congregations and other organizations desiring their services. This situation is likely to persist through the mid-1980's, despite an anticipated increase in the number of students

graduating from the Jewish theological seminaries.

One cause underlying the demand for rabbis is a continued growth in Jewish religious affiliation in the number of synagogues and temples, particularly in the suburbs of cities having large Jewish communities. Another is the demand of large congregations for assistant rabbis. However, there is a trend toward merger of several congregations in some communities, and this could effect somewhat the need for rabbis. Demand for rabbis to work with social welfare and other organizations connected with the Jewish faith also is expected to increase. Immigration, once an important source of rabbis, is no longer significant. In fact, graduates of American seminaries now are in demand for Jewish congregations in other countries. Over 450 American rabbis now serve in other countries.

Sources of Additional Information

Young people who are interested in entering the rabbinate should seek the guidance of a rabbi. Information on the work of a rabbi and occupations allied to it is available also from many of the local Boards of Rabbis in large communities. Each Jewish theological seminary can supply information on its admission requirements.

ROMAN CATHOLIC PRIESTS

(D.O.T. 120.108)

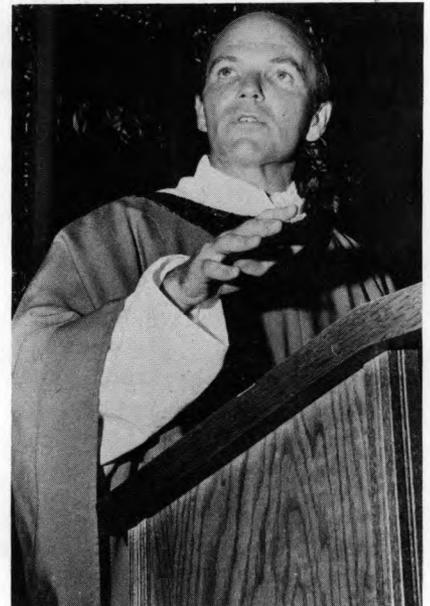
Nature of the Work

Roman Catholic priests attend to the spiritual, moral, and educational

needs of the members of their church. Their duties include offering the Sacrifice of the Mass; offering religious enlightenment in the form of a sermon; hearing confessions; administering the Sacraments, (including the sacrament of marriage); and conducting funeral services. They also comfort the sick, console relatives and friends of the dead, counsel those in need of guidance, and assist the poor.

Priests spend long hours working for the church and the community. Their day usually begins with morning meditation and Mass, and may end with the hearing of confessions or an evening visit to a hospital or a home. Many priests direct and serve in church committees, and in civic and charitable organizations; they may assist in community projects, as well.

There are two main classifications of priests—diocesan (secular) and religious. Both types have the same powers acquired through ordination by a bishop. The differences lie in their way of life, the type of work to which they are assigned, and the church authority to whom they are immediately subject. Di-



ocesan priests generally work on an individual basis in parishes, assigned to them by the bishop of their diocese. Religious priests generally work as part of a religious community comprised of members of the same religious order, such as the Jesuits, Dominicans, or Franciscans. They engage in specialized activities such as teaching or missionary work assigned to them by the superiors of their order.

Both religious and diocesan priests hold teaching and administrative posts in Catholic seminaries, colleges and universities, and high schools. Priests attached to religious orders staff a large proportion of the institutions of higher education and many high schools, whereas diocesan priests are concerned with the parochial schools attached to parish churches and with diocesan high schools. The members of religious orders do most of the missionary work conducted by the Catholic Church in this country and abroad.

Places of Employment

More than 58,000 priests served nearly 49 million Catholics in the United States in 1972. There are priests in nearly every city and town and in many rural communities; however, the majority are in metropolitan areas, where most Catholics reside. Catholics are concentrated in the Northeast and the Great Lakes regions, with smaller concentrations in California, Texas, and Louisiana. A large number of priests are located in communities near Catholic educational and other institutions.

Training and Other Qualifications

Preparation for the priesthood re-

quires 8 years more of study beyond high school. There are 450 seminaries offering such education. Study in preparation may begin in the first year of high school, at the college level, or in theological seminaries after college graduation.

High school seminaries provide a college preparatory program that emphasizes English grammar, speech, literature, and social studies. Two years of Latin are required and the study of modern language is encouraged. The seminary college offers a liberal arts program, stressing philosophy and religion; the study of man through the behavioral sciences and history; and the natural sciences and mathematics. In many college seminaries, a student may concentrate in any of these fields.

The remaining 4 years of preparation includes sacred scripture; apologetics (the branch of theology concerning the defense and proofs of Christianity); dogmatic, moral, and pastoral theology; homiletics (art of preaching); church history; liturgy (Mass); and canon law. Diocesan and religious priests attend different major seminaries, where slight variations in the training reflect the differences in the type of work expected of them as priests. During the later years of their seminary courses, candidates receive from their bishop a succession of orders (positions) culminating in their ordination to the priesthood. Priests are not permitted to both marry and remain priests.

Most postgraduate work in theology is given either at Catholic University of America, Washington, D.C., or at the ecclesiastical universities in Rome. Also, many priests do graduate work at other universities in fields unrelated to theology. Priests are commanded by the law of the Catholic Church to continue their studies, at least informally, after ordination.

Young men are never denied entry into seminaries because of lack of funds. In seminaries for secular priests, the bishop may make arrangements for student loans. Those in religious seminaries often are financed by contributions of benefactors.

The first assignment of a newly ordained secular priest is usually that of assistant pastor or curate. Newly ordained priests of religious orders are assigned to the specialized duties for which they are trained. Many opportunities for greater responsibility exist within the hierarchy of the church. Diocesan priests, for example, may rise to positions such as monsignor or bishop. Much of their time at this level is given to administrative duties. In the religious orders that specialize in teaching, priests may become heads of departments or assume other positions that include administrative duties.

Outlook

A growing number of priests will be needed in the years ahead to provide for the spiritual, educational, and social needs of the growing number of Catholics in the Nation. The number of ordained priests has been insufficient to fill the needs of newly established parishes and other Catholic institutions, and to replace priests who retire or die. This situation is likely to persist. However, many of the minor duties of priests are being assigned to lay deacons (nonordained professionals). Although priests usually continue to work longer than persons in other professions, the varied demands and long hours create a need for young priests to assist the older ones. Also, an increasing number of priests have been acting in many diverse areas of

service—in social work; religious radio, newspaper, and television work; labor-management mediation. They have also been serving in foreign posts, as missionaries, particularly in countries that have a shortage of priests.

Sources of Additional Information

Young men interested in entering the priesthood should seek the guidance and counsel of their parish priest. For information regarding the

different religious orders and the secular priesthood, as well as a list of the seminaries which prepare students for the priesthood, contact the Diocesan Directors of Vocations of the diocesan chancery office.

OTHER SOCIAL SERVICE OCCUPATIONS

COOPERATIVE EXTENSION SERVICE WORKERS

(D.O.T. 096.128)

Nature of the Work

Extension service workers are engaged with the farm area population in educational work in topics like agriculture, home economics, youth activities, and community resource development. They are employed jointly by State land grant universities and the U.S. Department of Agriculture. Extension workers must be proficient in both subject matter and teaching methods.

Extension workers help farm families analyze and solve their farm and home problems and aid in community improvement. Much of this educational work is carried on in groups, through meetings, tours, demonstrations, and use of local volunteer leaders. On problems that cannot be solved satisfactorily by such group methods, individual assistance is given. Extension workers rely heavily on use of mass communication media such as newspaper, radio, and television.

County extension workers help farmers produce, more efficiently, higher quality crops and livestock. They also help them develop new market outlets and plan production to meet market demands, including those for quality standards and varieties. They also help community leaders to improve the community, and to plan and provide for economic development, recreation, and more adequate public facilities such

as schools, water supply and sewer systems, and libraries. They help homemakers to provide more family enjoyment from existing resources, a higher level of nutrition, and a more pleasant home environment. Some extension workers help youths to become more useful citizens and to gain more personal satisfaction through programs in career selection, recreation, health, and leadership. The essence of extension work is to help people help themselves to achieve the goals they think are important.

County extension workers are supported by State Extension Specialists. The latter's job is to keep abreast of the latest research in their particular fields of interest, interpret this for use in extension programs, and help county extension workers develop educational programs, activities, and events to demonstrate use of this new knowledge.

Cooperative Extension Services employ persons with a wide range of skills. Staffs include workers skilled in all phases of crop and livestock production, conservation, environmental improvement, farm management and marketing, family living, human development, nutrition, home management, child development, sociology, psychology, veterinary medicine, engineering, textiles and clothing, resource economics, and business and public administration.

Places of Employment

Extension workers are located in county offices, area offices serving multi-county units, and State offices, the latter usually on the campus of the land-grant college or university.

Agents are located in nearly every county in the 50 States, Puerto Rico, and the District of Columbia. The county staffs range in size from one



Cooperative extension workers advise farmers about crop yields.

agent (serving a wide variety of clientele interests) to staffs of a dozen or more specialized agents in counties with high-density population and great diversity of interests. Staffs are located in counties ranging from the most rural to the most urban.

Training and Other Qualifications

Cooperative Extension agents assigned to counties are required to be proficient in disciplines related to the needs and programs of the clientele with whom they work. Each must have a B.S. degree in his subject-matter field; and some training in educational techniques is desirable, as well.

Often, they receive training in extension techniques in a pre-induction training program, and are upgraded through regular in-service training programs in both educational techniques and the subject-matter for which they are responsible. In addition to subject-matter proficiency and extension techniques, successful extension workers must like to work with people and to help them.

In most States, specialists and agents assigned to multicounty and State staff jobs are required to have at least one advanced degree and many must have the Ph.D.

Employment Outlook

Extension services employ more than 15,600 professional people. The demand for additional workers is expected to continue, especially in depressed rural areas. As agricultural technology becomes more complicated, and as farm people become more aware of the need for organized activity, more help will be sought from trained Extension Service personnel. The Extension Service also is being extended to new segments of the population, as residents recognize the value of their assist-

ance, particularly in helping the disadvantaged.

Counterparts of the Cooperative Extension Service are being established in many countries, and Extension Service personnel often are recruited to help initiate and organize these programs.

Earnings and Working Conditions

The salaries of extension workers vary from State to State and county to county. In the main, however, they are fully competitive with similar jobs in industry and government. Generally speaking, the career ladder for extension workers proceeds from assistant county agent to more responsible jobs within that county, or in another county in the State, to assignments on the State extension staff.

Sources of Additional Information

Additional information may be obtained from county extension offices, the State Director of the Cooperative Extension Service located at each land-grant university; or the Extension Service, U.S. Department of Agriculture, Washington, D.C. 20250.

HOME ECONOMISTS

(D.O.T. 096.128)

Nature of the Work

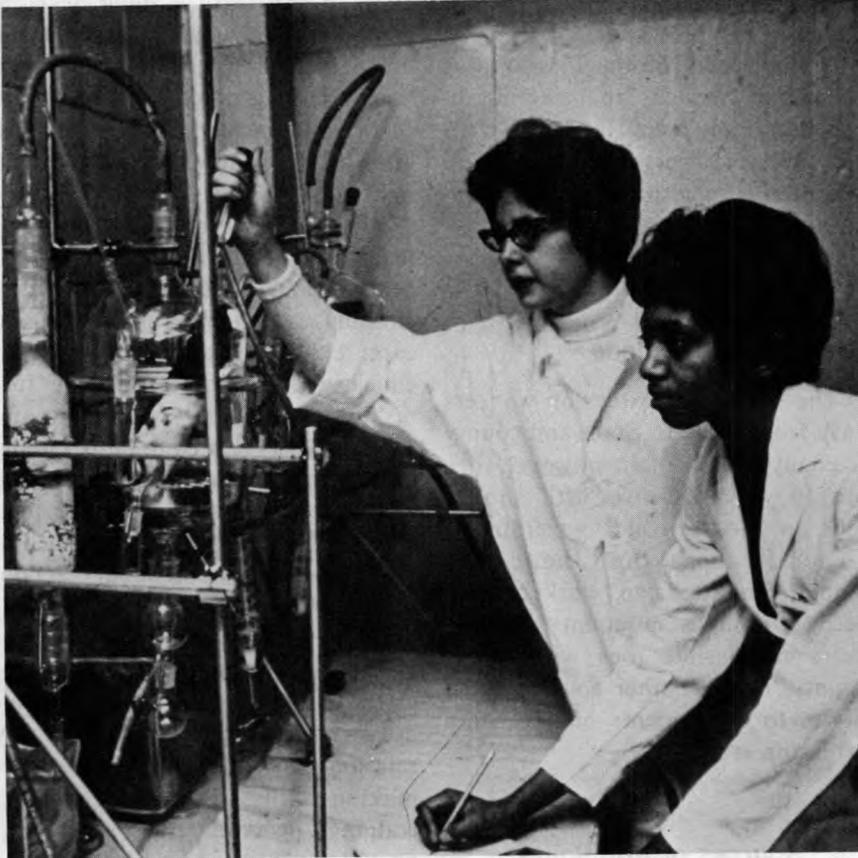
Home economists work to improve products, services, and practices that affect the comfort and well-being of the family. They may specialize in food and nutrition,

clothing and textiles, child development and family relations, housing, home furnishings and equipment, home management, or consumer economics, or they may have a broad knowledge of the whole professional field.

Most home economists work as teachers. They teach high school students about foods and nutrition; clothing, selection, construction and care; child development; consumer education; housing and home furnishings; and family relations, and other subjects related to family living and homemaking. They also perform the regular duties of other high school teachers that are described in the statement on secondary school teachers elsewhere in the Handbook.

Teachers in adult education programs help men and women to increase their understanding of family relations and to improve their homemaking skills. They also conduct training programs on secondary, post secondary, and adult levels for jobs related to home economics. Special emphasis is given to teaching those who are disadvantaged and handicapped. College teachers may combine teaching and research, and often specialize in a particular area of home economics.

Home economists employed by private business firms and trade associations promote the development, use, and care of specific home products. They may do research, test products, and prepare advertisements and instructional materials. Other duties may include preparing and presenting programs for radio and television, serving as consultants; giving lectures and demonstrations before the public, and conducting classes for salesmen and appliance servicemen. Some home economists study consumer needs and help manufacturers translate these needs into useful products.



Home economists do research on metabolism.

Food manufacturers employ home economists to work in test kitchens or laboratories to improve products and help create new ones. They also may publicize the nutritional values of their company's foods. Utility companies hire home economists to demonstrate appliances and services and to give advice on household problems. Home economists employed by kitchen and laundry equipment manufacturers may assist engineers on product development.

Home economists in the field of communications work for magazines, newspapers, radio and television stations, advertising and public relations agencies, and trade associations. They prepare articles, advertisements, and speeches about home economics products and services. They may also test and analyze

products and study consumer buying habits.

Home economists are employed by dress-pattern companies, department stores, interior design studios, and other business firms to help design, manufacture, and sell products for the home. Financial institutions sometimes employ home economists to give customers advice on spending, saving, and budgeting.

Some home economists conduct research for the Federal Government, State agricultural experiment stations, colleges, universities, and private organizations. The U.S. Department of Agriculture employs the largest group of researchers to do work such as study the buying and spending habits of families in all socio-economic groups and develop budget guides.

Home economists who work for the Cooperative Extension Service conduct adult education programs for men and women, and 4-H Club and other youth programs for girls and boys, in areas such as home management, consumer education, family relations and nutrition. Extension home economists also train and supervise volunteer leaders and paid aides who teach adults and youth. (See statement on Cooperative Extension Service Workers elsewhere in the *Handbook*.)

Federal, state, and local governments and private agencies employ home economists in social welfare programs to advise and counsel clients on the practical knowledge and skills needed for effective everyday family living. They may also help handicapped homemakers and their families adjust to the physical as well as social and emotional limitations by changing the arrangements in the home; finding efficient ways to manage household chores; aiding in the design, selection and arrangement of equipment; and creating other methods and devices to enable disabled people to function at their highest possible level. Other home economists in welfare agencies supervise or train workers who provide temporary or part-time help to households disrupted by illness.

Home economists in health services provide special help and guidance in home management, consumer education and family economics as it relates to family health and well-being. Activities of home economists working in health programs are home visits, conducting clinic demonstrations and classes in homemaking skills, financial counseling, assisting the mentally retarded mother, working with agencies and community resources, and supervising nutrition and home management aides.

Places of Employment

About 120,000 people worked in home economics professions in 1972. This figure includes 33,000 dietitians and 5,300 Cooperative Extension workers who are discussed in separate statements elsewhere in the *Handbook*. About 70,000 home economists are teachers, of whom about 50,000 teach in secondary schools. More than 15,000 are adult education instructors, some of whom teach part-time in secondary schools; about 5,000 home economists teach in colleges and universities. Others teach in community colleges, elementary schools, kindergartens, nursery schools and recreation centers.

More than 5,000 home economists work in private business firms and associations. Several thousand are in research and social welfare programs. A few are self-employed.

Although home economics generally has been considered a women's field, a growing number of men are employed in home economics positions. Most men specialize in foods and institutional management, although some are in the family relations and child development field, applied arts, consumer education, and other areas.

Training, Other Qualifications, and Advancement

About 370 colleges and universities offer a bachelor's degree in home economics, which qualifies graduates for most entry positions in the field. A master's or doctor's degree is required for college teaching, for certain research and supervisory positions, for work as an extension specialist, for some supervisory jobs, and for some jobs in the nutrition field.

Home economics majors study sciences and liberal arts—particu-

larly social sciences—as well as specialized home economics courses. They may concentrate in a particular area of home economics or in what is called general home economics. Advanced courses in chemistry and nutrition are important for work in foods and nutrition; science and statistics for research work; and journalism for advertising, public relations work, and all other work in the communications field. To teach home economics in high school, students must complete the courses required for a teacher's certificate.

Scholarships, fellowships, and assistantships are available for undergraduate and graduate study. Although colleges and universities offer most of these financial grants, government agencies, research foundations, businesses, and the American Home Economics Association Foundation provide additional funds.

Home economists must be able to work with people of various incomes and cultural backgrounds and should have a capacity for leadership. Good grooming, poise, and an interest in people also are essential for those who deal with the public. The ability to write and speak well is important.

Home economists frequently gain experience as teachers and advance to responsible positions in business, extension service work, supervision, and teacher education. Those who leave the profession, but later wish to return, may find jobs as part-time or full-time adult education teachers in programs such as the Cooperative Extension Service.

Employment Outlook

Home economists, especially those wishing to teach in high schools, may face some competition for jobs through the mid-1980's. Other areas of home economics also may experi-

ence competitive job market conditions as those unable to find teaching jobs look for other home economists positions. However, for those willing to continue their education toward an advanced degree, employment prospects in college and university teaching are expected to be good.

Although employment of home economists is expected to grow slowly, many jobs will become available each year to replace those who die, retire, or leave the field for other reasons. Growth will result from increasing awareness of the contributions that can be made by professionally trained home economists in quality child care, nutrition, housing and furnishings design, consumer education information, and man-environment relations. They also will be needed to promote home products, to act as consultants to consumers and to do research for improvement of home products and services. The Vocational Education Amendments of 1968, which provide funds for consumer and home-making education at the secondary, post-secondary, and adult levels, and focus on the needs of low income families, should further stimulate the need for home economists.

Earnings and Working Conditions

Home economics teachers in public schools generally receive the same salaries as other teachers. In 1972, the average starting salary of public school teachers with a bachelor's degree was \$7,400, according to a National Education Association survey. Experienced teachers averaged \$10,500. Median salaries of women teaching in colleges and universities in 1972 ranged from \$8,900 for instructors to \$16,400 for professors.

The Federal Government paid

home economists with bachelor's degrees starting salaries of \$7,700 and \$9,500 in early 1973, depending on their scholastic record. Those with additional education and experience generally earned from \$11,600 to \$19,700 or more, depending on the type of position and level of responsibility.

Cooperative extension workers on the county level averaged \$10,300 while those on the State level averaged \$14,200 in 1972. In general, home economists earn about one and one-half times as much as non-supervisory workers in private industry, except farming.

Home economists usually work a 40-hour week. Those in teaching and extension positions, however, frequently work longer hours because they are expected to be available for evening lectures, demonstrations, and other work. Most home economists receive fringe benefits, such as paid vacation, sick leave, retirement pay, and insurance benefits.

Sources of Additional Information

A list of schools granting degrees in home economics and additional information about home economics careers, the types of home economics majors offered in each school granting degrees in home economics, and graduate scholarships are available from:

American Home Economics Association, 2010 Massachusetts Ave. NW., Washington, D.C. 20036

PSYCHOLOGISTS

(D.O.T. 045.088 and .108)

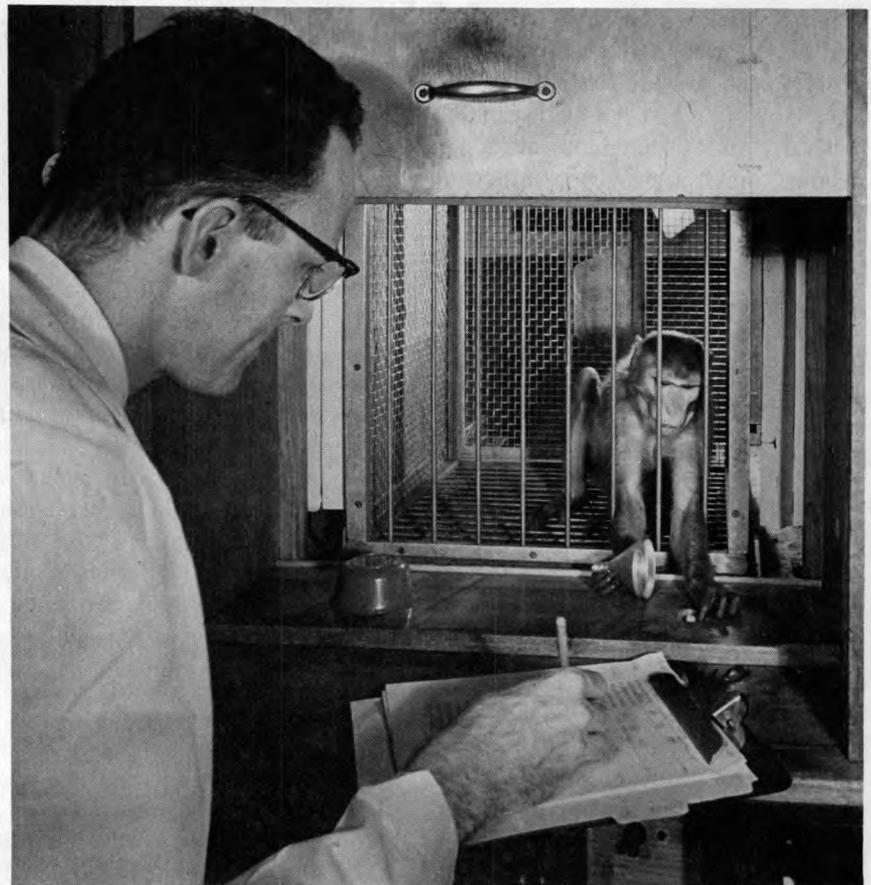
Nature of the Work

Psychologists study the normal and abnormal behavior of individuals and groups in order to understand and explain their actions. In the course of their work, they may be concerned with the problems of emotional stress and abnormal behavior, the causes of low morale, or the effective performance of an astronaut. Some teach in colleges and universities; others provide counseling services, plan and conduct training programs for workers, conduct research, advise on psychological methods and theories, or administer

psychology programs in hospitals, clinics, or research laboratories. Many psychologists combine several of these activities.

Psychologists gather information about the capacities, interests, and behavior of people in various ways. They interview individuals, develop and administer tests and rating scales, study personal histories and conduct controlled experiments. Psychologists also often design and conduct surveys.

Areas of specialization in psychology include *experimental psychology*—in which behavior processes are studied in the laboratory; *developmental psychology*—the study of the causes of behavioral changes as people progress through



Psychologist experiments with monkey for insight into human behavior.

life; *personality*—the study of the processes by which a person becomes a unique individual; *social psychology*—in which people's interactions with others and with the social environment are examined; *educational and school psychology*—which are concerned with the psychological factors in the process of education; *comparative psychology*—in which the behavior of different animals, including man, is compared; *physiological psychology*—the study of the relationship of behavior to the biological functions of the body; and *psychometrics*—the development and application of procedures for measuring psychological variables.

Psychologists often combine several areas of psychology in their specialty. *Clinical psychologists* are the largest group of specialists. They generally work in mental hospitals or clinics, and are involved mainly with problems of mentally or emotionally disturbed people. They interview patients, give diagnostic tests, and provide individual, family, and group psychotherapy, and design and carry through behavior modification programs. *Counseling psychologists* help people with important problems of everyday living. In their work, they may use developmental psychology, psychopathology, personality, educational psychology, and psychometrics. Other combination fields are *industrial and organizational psychology* where problems of motivation and morale in work situations are studied; *engineering psychology*, the development and improvement of man-machine systems; *consumer psychology*, the study of the psychological factors that determine an individual's behavior as a consumer of goods and services; and *environmental psychology*, the relationships between individual qualities and the environment.

Places of Employment

About 57,000 people, one-fourth of them women, worked as psychologists in 1972. More than 40 percent of the total worked in colleges and universities, either as teachers, researchers, or counselors. The second largest number of psychologists work for Federal, State, and local government agencies. Federal agencies that employ the most psychologists are the Veterans Administration, the Department of Defense, and the Public Health Service.

Many psychologists work in public schools, clinics, hospitals, medical schools, and for business or industry. Some are in independent practice, and others serve as commissioned officers in the Armed Forces and the Public Health Service.

Training, Other Qualifications, and Advancement

Generally, a master's degree in psychology is the minimum educational requirement for professional employment in the field. People who have this degree can qualify for positions where they administer and interpret psychological tests, collect and analyze statistical data, conduct research experiments, and perform administrative duties. They also may teach in colleges, counsel students or handicapped persons, or—if they have had previous teaching experience—work as school psychologists or counselors. (See statements on School Counselors and Rehabilitation Counselors.)

A Ph.D. degree—the mark of the full professional—is needed for many entrance positions and is becoming increasingly important for advancement. People who have doctorates in psychology qualify for the more responsible research, clinical, and counseling positions, as well as for the higher level positions in colleges and universities and in Federal and State programs.

At least 1 year of full-time graduate study is needed to earn a master's degree in psychology. An additional 3 to 5 years of graduate work usually are required in order to get a Ph.D. In clinical or counseling psychology, the requirements for the Ph.D. degree generally include an additional year of internship or supervised experience.

Some universities require applicants for graduate work in psychology to have had an undergraduate major in that field. Others prefer broader educational backgrounds that include not only some basic psychology but also courses in the biological, physical, and social sciences, statistics, and mathematics.

Many graduate students receive financial help in the form of fellowships, scholarships, or part-time employment from universities and other sources. Several Federal agencies provide funds to graduate students, generally through the college or university that provides the training. The Veterans Administration offers a number of pre-doctoral traineeships, during which time the students receive payments and gain supervised experience in VA hospitals and clinics. The National Science Foundation, the U.S. Office of Education, the Public Health Service, the Rehabilitation Services Administration, and the National Institute of Mental Health also provide fellowships, grants, and loans for advanced training in psychology. However at present the trend at the federal level is toward low-interest loans and away from fellowships and grants.

The American Board of Professional Psychology awards diplomas in clinical, counseling, industrial, and school psychology to those who have outstanding educational records and experience and who pass the required examinations.

Psychologists who want to enter

independent practice must meet certification or licensing requirements in an increasing number of States. In 1972, 46 States had these requirements.

People pursuing a career in psychology must be emotionally stable, mature, and able to deal effectively with people. Sensitivity, patience, and a genuine interest in others are particularly important for work in clinical and counseling psychology. Research psychologists should be able to do detailed and independent work; verbal and writing skills are necessary to communicate research findings.

Employment Outlook

Employment opportunities for psychologists are expected to be good through the mid-1980's. Opportunities should be very good for Ph.D.'s and for some master's degree holders specializing in clinical or counseling psychology.

Employment of clinical, counseling, and social psychologists in mental hospitals, correctional institutions, mental hygiene clinics, and community health centers is expected to expand rapidly. Many openings for psychologists also are anticipated in the Federal Government, primarily in the Veterans Administration and the Department of Defense.

Psychologists may find some competition for job openings in large colleges and universities which are preferred locations for many specialties in psychology. However, those wishing to work in the relatively smaller and newer publicly-supported institutions should have good employment prospects. The rapid growth of two-year colleges also will create many openings for psychologists.

Other openings will exist for clinical, educational, and industrial psychologists. Growing awareness of the need for testing and counseling children is expected to increase the need for psychologists in schools. Increased public concern for the development of human resources as evidenced by Medicare and Medicaid will further increase the demand for psychologists. Other openings may occur as psychologists move into new employment fields where their services are beginning to be recognized as useful. Government agencies are finding that psychologists can conduct surveys and offer services, such as recommending methods for improving public opinion and anticipating reactions to government programs.

Many vacancies also will occur each year as a result of retirements and deaths. The transfer of psychologists to purely administrative work also will create some job vacancies.

Earnings and Working Conditions

In 1972, starting salaries for psychologists holding a master's degree averaged about \$11,000 a year, according to the American Psychological Association. Beginning salaries for those holding a doctorate averaged \$13,000.

Median salaries of psychologists teaching in graduate departments ranged from \$12,800 for assistant professors to \$20,900 for full professors during the academic year 1972-73 (9-10 months), according to a survey conducted for the Conference of Chairmen of Graduate Departments of Psychology.

In the Federal Government, psychologists having a Ph.D. degree and 1 year of internship started at \$14,000 a year in early 1973. With 1 year

of experience, Ph.D.'s earned about \$16,700. The average salary for Ph.D. psychologists in the Veterans Administration was about \$21,500 a year. In general, psychologists earn over twice as much as the average nonsupervisory worker in private industry, except farming.

Working conditions for psychologists who teach in colleges and universities are the same as for other faculty members. Most colleges provide for sabbatical leaves of absence, life and health insurance, and retirement plans. Working hours are generally flexible, but often entail some evening work with individual students or organized groups. Clinical and counseling psychologists often work in the evenings since their patients sometimes are unable to leave their jobs or school during the day.

Sources of Additional Information

For general information on career opportunities, certification or licensure requirements, and educational facilities and financial assistance for graduate students in psychology, contact:

American Psychological Association,
1200 17th Street, NW., Washing-
ton, D.C. 20036.

Information on traineeships and fellowships is available from colleges and universities that have graduate psychology departments.

RECREATION WORKERS

(D.O.T. 079.128, 159.228, 187.118,
195.168, 195.228)

Nature of the Work

Participation in sports, hobbies, and other recreation activities has become an integral part of the increasing leisure time enjoyed by many Americans. Recreation workers direct individual and group recreation activities to help people better enjoy nonworking hours and to promote physical fitness, fair play, and good sportsmanship.

Recreation workers organize and lead social, cultural, and physical education programs at camps, community centers, hospitals, work places, and playgrounds for people of various ages and interests. They also manage recreation facilities and study the recreation needs of groups and communities. There are three basic types of recreation workers: recreation leaders and camp counselors, activity specialists, and recreation directors.

Recreation leaders and camp counselors lead indoor and outdoor recreation activities. They instruct people in the proper use of facilities and the correct rules and techniques used in sports, games, and other activities.

Activity specialists lead and instruct people in specific activities such as archery, swimming, or tennis. They often conduct classes and coach teams in the activity in which they specialize.

Recreation supervisors or directors administer recreation programs, departments, and camps. They manage facilities and supervise recreation workers, maintenance personnel, and attendants. They develop new programs and organize sports leagues and teams, tournaments, and contests that bring people with similar interests together.

Directors of city recreation departments, camps, or private nonprofit organizations coordinate and evaluate the many types of recreation programs and often prepare program budgets.

Recreation workers employed by local government and voluntary agencies direct activities at neighborhood playgrounds and indoor recreation centers. They provide instruction in the arts and crafts and in sports. They may supervise recreational activities at correctional institutions and work closely with social workers to organize programs for the young and the aged. School recreation workers organize the leisure-time activities of school-age children during schooldays, weekends, and vacations.

Recreation workers in industry and in the Armed Forces direct bowling leagues, softball teams, and similar activities for servicemen and company employees. They also often plan social functions and fund drives.

Under the supervision of a camp director, recreation workers in camps lead and instruct campers in nature-oriented forms of recreation such as swimming, hiking, and horseback riding. In resident camps, recreation workers must also safeguard the health and well-being of campers.

Therapeutic recreation workers plan recreation programs for the ill and the handicapped in hospitals, convalescent homes, and other institutions. Working under medical direction, they organize and direct sports, dramatics, arts, and crafts for persons suffering from mental problems and physical disabilities.

Places of Employment

More than 55,000 recreation workers were employed year-round in 1972; nearly one-half of them were women. Government recreation

departments employed about one-half, primarily in local recreation departments. Many others worked for schools, commercial recreation establishments like camps or resort hotels, and nonprofit voluntary organizations such as athletic or scouting organizations, churches, and community organizations.

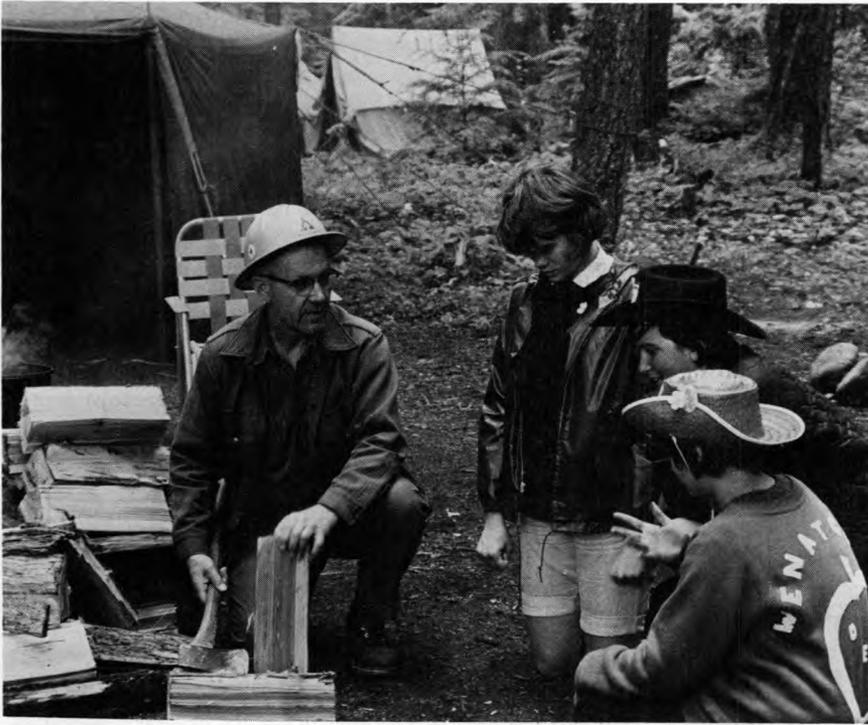
Although part-time recreation workers and volunteers assist full-time workers throughout the year, an additional 120,000 recreation workers were employed for the summer months only, during 1972. Seasonal workers are mostly college students and teachers who work primarily as recreation leaders and camp counselors.

Recreation workers are employed mostly in urban areas where many people must use the same playgrounds and recreation centers. Camp recreation workers, however, work generally in rural, less populated areas of the country. Camp recreation workers are employed at resident, day, family, and travel camps. Except for the directors of very large camps and workers at the few camps which remain open year-round, all camp recreation workers are employed for two or three months only during the summer.

Training, Other Qualifications, and Advancement

A high school education is generally the minimum requirement for recreation leader and camp counselor jobs. However, an associate degree in recreation or a related subject, from a community or junior college usually is preferred for year-round employment.

Activity specialists should have an associate or bachelor's degree in recreation or in one of the arts, to hold year-round jobs. Part-time or seasonal work experience as a recreation leader or camp counselor



Recreation worker teaches camping skills.

often is required. Many activity specialists who concentrate in subjects such as drama, art, or dance have graduate degrees.

Generally recreation directors must have a bachelor's degree with a major in recreation, social science, or physical education as well as part-time or seasonal experience. Advanced courses in recreation or public administration leading to a master's degree are desirable for persons interested in higher level administrative positions.

The typical program of recreation study includes courses in communications, natural sciences, the humanities, philosophy, sociology, drama, and music. Specific courses in recreation include group leadership, program planning and organization, health and safety procedures, outdoor and indoor sports, dance, arts and crafts, and field work in which the student obtains actual recreation leadership experience. Students in-

terested in industrial recreation may find it desirable to take courses in business administration; those interested in therapeutic recreation should take courses in psychology, health education, and sociology.

Young people planning careers as recreation workers must have the ability to motivate people and be sensitive to their needs. Good health and physical stamina are required to participate in sports. Activity planning often calls for creativeness and resourcefulness. Recreation workers should be able to accept responsibility and exercise judgment since they usually work alone. To increase their leadership skills and understanding of people, students should obtain related work experience in high school and college. They may do volunteer, part-time, or summer work in recreation departments, camps, youth-serving organizations, institutions, and community centers.

Most college graduates then enter

the recreation field as activity specialists or recreation directors. Beginning recreation director jobs include recreation facility director, community center director, and supervisor of recreation leaders and attendants. A small number of college graduates begin in jobs that lead directly to administrative recreation positions. A few large cities and organizations offer recreation director trainee programs that generally last 1 year.

After a few years' experience, activity specialists, and often recreation leaders, may become recreation directors. Opportunities for advancement to administrative positions often are limited for persons without graduate training. However, advancement is sometimes possible through a combination of education and experience.

Employment Outlook

Employment opportunities for persons having a bachelor's degree in recreation are expected to be excellent. As the number of college graduates with a major in recreation falls short of the demand, employment opportunities in this field will continue to be favorable for persons that have college training in social science, physical education, and health education. Opportunities for part-time and volunteer work should be plentiful, particularly in local government recreation departments.

Employment of recreation workers is expected to increase very rapidly through the mid-1980's. Population growth, increased leisure time and rising incomes underlie the expected growth in employment of recreation workers. As incomes rise, more people will participate in a variety of organized competitive and noncompetitive sports and larger numbers will travel to parks, camps, and resorts for camping, hiking, fish-

ing, and other recreation pursuits.

Public pressure for recreation areas may result in the creation of many new parks, playgrounds, and national forests, and increased attention to physical fitness by government, educators, and others may produce a rise in public and industrial recreation programs. Longer life and earlier retirements also will increase the demand for recreation programs for retired persons. All of these factors will increase the need for recreation workers.

Earnings and Working Conditions

Annual salaries for recreation leaders in State and local governments ranged between \$7,000 and \$9,000 in 1972, according to a survey by the Public Personnel Association. In general, earnings are higher than the average for nonsupervisory workers in private industry, except in farming.

Persons with bachelor's degrees in recreation generally received starting salaries ranging between \$7,200 and \$9,000, according to the National Recreation and Park Association. Recreation directors' salaries ranged from \$11,000 to more than \$20,000 depending on their responsibilities.

In early 1973, starting salaries for recreation workers in the Federal Government were \$7,694 for applicants having a bachelor's degree or 3 years of recreation work experience. Persons with a good academic record, specialized training, or 4 years of experience could qualify for a starting salary of \$9,520; those with a master's degree or an additional year of experience, \$11,614.

Recreation worker salaries tend to be higher in the West than in other areas of the country.

The average workweek for recreation workers is 40 hours, although

some work more than 50 hours. Many camp recreation workers live at the camps where they work, and their room and board is included in their salaries. Most public and private recreation agencies provide from 2 to 4 weeks vacation and other fringe benefits such as sick leave and hospital insurance.

A person entering the recreation field should expect some night work and irregular hours since they often work while others are enjoying leisure time. Recreation workers usually spend most of their time outdoors when the weather permits.

Sources of Additional Information

Information about recreation as a career, employment opportunities in the field, and colleges and universities offering recreation curriculums is available from:

National Industrial Recreation Association, 20 North Wacker Dr., Chicago, Ill. 60606.

National Recreation and Parks Association, 1601 North Kent St., Arlington, Va. 22209.

For information on careers in camping and job referrals, contact:

American Camping Association, Bradford Woods, Martinsville, Indiana 46151.

hampered by social problems that range from an individual's personal problems to social unrest within a group or community. These problems aggravated by the growing complexity of society, have greatly increased the need for social services. Social workers assist individuals, families, and groups in using these services to solve their problems.

Many social service programs are designed to meet the needs of individuals or families, some emphasize large groups, and still others are directed mainly to the community's social welfare. The three basic approaches to social work are casework, group work, and community organization. The approach used in tackling a social problem is usually determined by the nature of the problem and the time and resources available. Social workers sometimes combine two or all three approaches.

In casework, social workers identify the problems of individuals and families through interviews. They aid in understanding and solving problems and help secure needed services, education, and job training. Through group activities, social workers help people to understand themselves and others better, to overcome racial and cultural prejudices, and to work with others in achieving a common goal. They plan and conduct activities for children, adolescents, adults, and older persons in a variety of settings such as settlement houses, hospitals, homes for the aged, and correctional institutions. In community organization, social workers organize political, civic, religious, business, and union groups to combat social problems through community programs. They help plan and develop health, housing, welfare, and recreation services for a neighborhood or larger area. They often coordinate existing social services and organize fund rais-

SOCIAL WORKERS

(D.O.T. 195.108, .118, .168, and .208, .228)

Nature of the Work

The ability of people to live in harmony with their neighbors often is



ing for community social welfare activities.

The majority of social workers provide social services directly to individuals, families, or groups. However, a substantial number are executives, administrators, or supervisors. Others are college teachers, research workers, consultants, or private practitioners.

Public and voluntary agencies have a variety of social work programs to meet specific needs, as suggested by the following descriptions of the principal areas of social work.

Social workers in family service positions in State and local welfare offices and voluntary agencies provide counseling and social services that strengthen personal relationships and help clients to improve their social functioning. They also advise their clients on the constructive use of financial assistance and other social services.

Social workers in child welfare positions in government and voluntary agencies work to improve the physical and emotional well-being of deprived and troubled children and youth. They advise parents on child care and child rearing, counsel children and youth with social adjustment difficulties, arrange homemaker services during a mother's illness, institute legal action for the protection of neglected or mistreated children, provide services to unmarried parents, and counsel couples who wish to adopt children after making appropriate case evaluations and home studies, they may place children in suitable adoption or foster homes or in specialized institutions.

Social workers in schools aid children whose unsatisfactory school behavior is related to their social problems. These workers consult and work with parents, teachers, counselors, and other school personnel to

identify and solve problems that hinder satisfactory adjustment.

Social workers in medical and psychiatric settings such as hospitals, clinics, health and mental health agencies, rehabilitation centers, and public welfare agencies aid patients, their families and communities with social problems accompanying illness, recovery, and rehabilitation. As members of medical teams, they help patients respond to treatment and guide them in their readjustment to their homes, jobs, and communities. (The related occupation of rehabilitation counselor is discussed in a separate statement.)

Probation and parole officers and other social workers engaged in correctional programs help offenders and persons on probation and parole readjust to society. They counsel on social problems encountered in relation to their return to family and community life. Probation and parole officers also may help secure necessary education, training, employment, or community services.

Places of Employment

About 185,000 social workers were employed in 1972; nearly two-thirds of them were women. Federal, State, county and city government agencies employ about two-thirds of all social workers. Most of the remainder work for voluntary or private agencies, schools, hospitals, and other medical establishments. Although employment is concentrated in urban areas, many work with disadvantaged families in rural areas. A small number of social workers—employed by the Federal Government and the United Nations or one of its affiliated agencies—serve in other parts of the world as consultants, teachers, or technicians and establish agencies, schools, or assistance programs.

Training, Other Qualifications, and Advancement

A bachelor's degree, preferably in social welfare or social work, generally is the minimum educational requirement for beginning jobs in social work. In several specialized areas, a master's degree in social work is required. For teaching positions, a master's degree in social work is also required, and a doctorate is preferred. A graduate degree and experience in social work, as well as training in social science research methods, are required for research work. In most States, applicants for employment in a government agency must pass a written examination.

Two years of specialized study and supervised field instruction are needed to earn a master's degree in social work. In 1971, 81 colleges and universities offered accredited graduate degree programs in social work. For admission to these schools, a student must have a bachelor's degree, preferably including courses in economics, history, political science, psychology, social work, sociology, and social anthropology.

Many scholarships and fellowships are available for graduate education. More than half of the full-time students in graduate schools receive some type of financial aid either from the schools or employing agencies. Some social welfare agencies, both voluntary and public, offer plans whereby workers are granted "educational leave" to obtain graduate education. The agency may pay the expenses or a salary, or both.

Social workers should be emotionally mature, objective, sensitive, and possess a basic concern for people and their social problems. They must be able to handle responsibility and work independently, form and sustain good working relationships, and encourage social adjustment in

others.

Students should obtain as much related work experience as possible during high school and college to determine whether they have the interest and capacity for professional social work. They may do volunteer, part-time, or summer work in places such as camps, settlement houses, hospitals, community centers, or social welfare agencies. Some voluntary and public social welfare agencies hire students for jobs in which they assist social workers.

Employment Outlook

Employment opportunities for persons having bachelor's degrees in social welfare or related fields should be favorable through the remainder of the 1970's. Competition may increase in the 1980's, however, if the number of social work graduates increases along with growth of all college graduates. The outlook for graduates of master's degree programs in social work is expected to continue to be very good through the mid-1980's. Women with social work experience should have favorable prospects for part-time work.

The very rapid growth in employment of social workers that is expected through the mid-1980's will stem primarily from anticipated expansion in programs to provide services to disadvantaged individuals and groups. The occupational structure of the economy is expected to continue to change and create severe problems for many unskilled workers and others whose jobs have been replaced by machines. In addition, social change will continue to affect family life. The increasing population of the very young and the very old, the age groups most in need of social work services, also is expected to contribute to the demand for social workers.

Earnings and Working Conditions

Social worker earnings are generally above the average earnings of all nonsupervisory workers on private non-farm payrolls. Various State agencies paid social caseworkers with bachelor's degrees average starting salaries of about \$6,900 a year, according to an early 1972 survey of selected occupations by the Public Personnel Association. Salaries of casework supervisors in State agencies ranged from \$8,800 for those having little experience to about \$11,500 for those having considerable experience. Salaries of psychiatric social workers averaged from \$8,700 to \$10,800; those of probation and parole officers averaged from about \$7,800 to \$9,900.

Social workers employed by cities and urban counties tend to average \$1,000 to \$2,000 more than those paid by State agencies, in many instances according to the survey cited.

Persons having Masters' degrees in social work received starting salaries of about \$10,000 in 1972, according to a survey by the National Association of Social Workers. Those having experience earned median salaries of about \$13,000. Private practitioners and those in administrative, teaching, and research jobs earned more than \$16,000.

Persons having a bachelor's degree in social work or 3 years of appropriate work experience hired by the Federal Government in 1972, began as social service assistants and received \$7,319 a year. Master's degree graduates of accredited schools of social work started at \$9,053 a year; those having professional social work experience could begin at a higher salary. Salaries of journeymen social workers employed by the Federal Government ranged from \$13,309 to \$17,305.

Most social workers have a 5 day week, but many work only part-time. In some social work agencies, however, the nature of the work requires evening and weekend work, for which social workers usually receive compensatory time off. Virtually all social work agencies provide fringe benefits such as paid vacations, sick leave, and retirement plans.

Sources of Additional Information

For information about career opportunities in the various fields of social work, contact:

National Association of Social Workers, 15th and H St. NW., 600 Southern Building, Washington, D.C. 20005.

Information on accredited graduate and undergraduate college programs in social work is available from:

Council on Social Work Education,
345 East 46th St., New York, N.Y.
10017.

ART, DESIGN, AND COMMUNICATIONS RELATED OCCUPATIONS

PERFORMING ARTISTS

The performing arts include music, acting, singing, and the dance. In these fields, the number of talented persons seeking employment generally greatly exceeds the number of full-time positions available. As a result, many performers supplement their incomes by teaching, and others work much of the time in different types of occupations.

The difficulty of earning a living as a performer is one fact young persons should remember when they consider such a career. They should consider, therefore, the possible advantages of making their art a hobby rather than a profession. Aspiring young artists usually must spend many years in intensive training and practice before they are ready for public performances. They need not only great natural talent but also determination, a willingness to work long and hard, and an overwhelming interest in their chosen field.

The statements which follow this introduction give detailed information on musicians, singers, actors, and dancers.

ACTORS AND ACTRESSES

(D.O.T. 150.028 and 150.048)

Nature of the Work

Making a character come to life before an audience is a job that has great glamour and fascination. It

also is hard and demanding work that requires special talent and involves many difficulties and uncertainties.

Only a few actors and actresses achieve recognition as stars on the stage, in motion pictures, or on television or radio. A somewhat larger number are well-known, experienced performers, who frequently are cast in supporting roles. However, most actors and actresses struggle for a toehold in the profession, and are glad to pick up parts wherever they can.

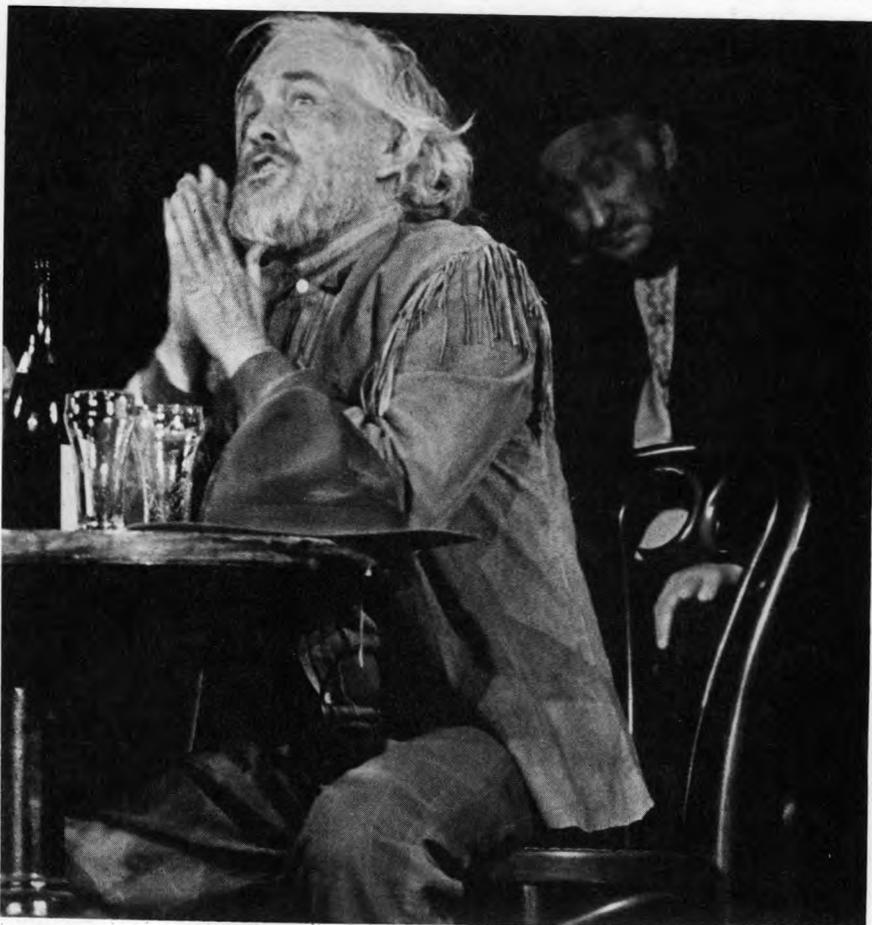
New actors generally start in "bit" parts, where they speak only a few

lines. If successful, they may progress to larger, supporting roles, of which there are several in most stage, television, and screen productions. They also may serve as understudies for the principals. If a leading player misses a performance the understudy has a chance to demonstrate his acting ability.

Actors who prepare for stage, screen, and television roles rehearse many hours. They must memorize their lines and know their cues.

In addition to the actors with speaking parts, "extras," who have no lines to deliver, are used in various ways in almost all motion pictures and many television shows and theatre productions. In "spectacular" productions, a large number of extras take part in crowd scenes.

Some actors find alternative jobs



as dramatic coaches or become directors of stage, television, radio, or motion pictures productions. A few teach in schools of acting or in the drama departments of colleges and universities.

Places of Employment

About 9,000 actors and actresses work in the United States. The principal areas of employment for actors are stage plays, motion pictures (including films made especially for television), industrial shows and commercials.

In the winter, most employment opportunities on the stage are in New York and other large cities. In the summer months, stock companies in suburban and resort areas throughout the Nation provide many opportunities for employment. In addition, many cities now have "little theatres," repertory companies and dinner theatres, which provide opportunities for local talent as well as for professional actors and actresses from New York and other centers. Plays that go "on the road" (move from city to city) are normally produced in New York City with cast selected there.

Employment in motion pictures and film television is essentially centered in Hollywood and New York City, although a few studios are located in Miami, and other parts of the country. In addition, many films are shot on location, providing employment for nonprofessionals who live in the area as "extras." An increasingly large number of American-produced films are being shot in foreign countries. In television, most opportunities for actors are at the headquarters of the major networks—in New York, Los Angeles, and, to a lesser extent, Chicago. A few local television stations occasionally employ actors.

Training, and Other Qualifications

Young persons who aspire to acting careers should take part in high school and college plays, or work with little theatres and other acting groups in their home towns to get as much acting experience as possible.

Formal training in acting is increasingly necessary. Such training can be obtained at special schools of the dramatic arts, located chiefly in New York, and in more than 1,600 colleges and universities throughout the country. College drama curriculums usually include courses in liberal arts, speech, pantomime, play production, and history of the drama, as well as practical courses in acting. From these, the student develops an appreciation of the great plays and a greater understanding of the roles he may be called on to play. Graduate degrees in the fine arts or in drama are needed for college teaching positions.

Acting demands patience and total commitment, since aspiring actors and actresses must wait for parts or filming schedules, work long hours, and often do much traveling. Flawless performances require long rehearsal schedules and the tedious memorizing of lines. The actor needs stamina to withstand the heat of stage or studio lights, or the adverse weather conditions which may exist "on location." Above all, young persons who plan to pursue an acting career must have talent and the creative ability to portray different characters. They must have poise, stage presence, and aggressiveness to project themselves to the audience. At the same time, the ability to follow directions is important.

In all media, the best way to start is to use local opportunities and to build on the basis of such experience. Many actors who are successful in local dramatic productions eventually try to appear on the New

York stage. Inexperienced actors usually find it extremely difficult to obtain employment in New York or Hollywood. The motion picture field is especially difficult to enter, and employment often results from previous experience on Broadway.

To become a movie extra, one must usually be listed by Central Casting, a no-fee agency which works with the Screen Extras Guild and supplies all extras to the major movie studios in Hollywood. Applicants are accepted only when the number of persons of a particular type on the list—for example, athletic young men, old ladies, or small children—is below the foreseeable need. In recent years, only a very small proportion of the total number of applicants have succeeded in being listed. Extras have very little, if any, opportunity to advance to speaking roles in the movies.

The length of an actor's working life depends largely on his skill and versatility. Great actors and actresses can work almost indefinitely. On the other hand, employment opportunities become increasingly limited by middle age, especially for those who become typed in romantic, youthful roles.

Employment Outlook

Overcrowding has existed in the acting field for many years and it is expected to persist. In the legitimate theater and also in motion pictures, radio, and television, numbers of job applicants greatly exceed the jobs available. Moreover, many actors are employed in their profession for only a small part of the year.

The development of motion pictures and TV has greatly reduced employment opportunities for actors in the theater. Although a motion picture production may use a very large number of actors, they are employed only during filming and the

films are widely distributed and may be used for years. Also, the increasing number of American-produced films being shot in foreign countries will reduce employment opportunities for American actors. The number of filmed TV dramas and commercials using actors is increasing, but not enough to offset the decline in other media. Moreover, television stations often broadcast "taped" dramas rather than live productions, and, like motion picture films, these tapes may be widely distributed and used many times.

One possibility for future growth in the legitimate theater lies in the establishment of year-round professional acting companies in cities. The number of communities with such acting groups is growing. The recent growth of summer and winter stock companies, repertory companies, and dinner theaters also has increased employment opportunities. Some increases also may be likely in the employment of actors on television in response to expansion of the Public Broadcasting System, UHF stations, and cable TV (pay TV). The development and wider use of video cassettes also may result in some employment opportunities.

In the acting field as a whole, however, employment is expected to change little through the mid-1980's. The number of persons who want to enter the profession is expected to outnumber employment opportunities. Even highly talented young people are likely to face stiff competition and economic difficulties.

Earnings and Working Conditions

Actors and actresses employed in the legitimate theater belong to the Actors' Equity Association. If employed in motion pictures, including television films, they belong to the Screen Actors Guild, Inc., or to the

Screen Extras Guild, Inc. If employed in television or radio, they belong to the American Federation of Television and Radio Artists (AFTRA). These unions and the show producers sign basic collective bargaining agreements which set minimum salaries, hours of work, and other conditions of employment. Each actor also enters into a separate contract which may provide for higher salaries than those specified in the basic agreement.

The minimum weekly salary for actors in Broadway productions was about \$197.50 in 1972. Those in small "off-Broadway" theaters received a minimum of \$125 a week. For shows on the road, the minimum rate was about \$274.50 a week. (All minimum salaries are adjusted upward automatically, by union contract, commensurate with increases in the cost of living as reflected in the Bureau of Labor Statistics Consumer Price Index).

Motion picture actors and actresses earned a minimum daily rate of \$140, or \$483 for a five day week, in 1972. For extras, the minimum rate was \$35.65 a day. Actors on network television received a minimum program fee of about \$180 for a single half-hour program and 10 hours of rehearsal time; actors on radio received about \$50 for a half-hour performance, including one rehearsal hour. Because of the frequent periods of unemployment, characteristic of this profession, annual earnings may be low for many lesser-known performers. In all fields, many well-known actors and actresses have salary rates above the minimums. Salaries of the few top stars are many times the figures cited.

Eight performances amount to a week's work on the legitimate stage, and any additional performances are paid for as overtime. The basic workweek after the opening of a show is

36 hours, including 12 hours for rehearsals. Before the openings, however, the workweek usually is longer to allow enough time for rehearsals. Evening work is, of course, a regular part of a stage actor's life. Rehearsals may be held late at night and on weekends and holidays. When plays are on the road, traveling over the weekend often is necessary.

Most actors are covered by a pension fund and a growing number have hospitalization insurance to which their employers contribute. All Equity and AFTRA members have paid vacations and sick leave. Most stage actors get little if any unemployment compensation solely from acting since they seldom have enough employment in any State to meet the eligibility requirements. Consequently, when a show closes, they often have to take any casual work obtainable while waiting for another role.

Sources of Additional Information

Information on colleges and universities and conservatories which offer a major in drama is available from the American Educational Theater Association, 1317 F Street, NW., Washington, D.C. 20004.

DANCERS

(D.O.T. 151.028 and 151.048)

Nature of the Work

Dancing is an ancient and worldwide art that has many different forms. Professional dancers may perform in classical ballet or modern dance, in dance adaptations for musical shows, in folk dances, and in other popular kinds of dancing. In classical ballet, movements are based



on certain conventional or styled "positions," and women dance "en pointe" (on the tips of their toes). In the modern dance, movements are more varied but are nonetheless carefully planned and executed to follow a pattern.

In dance productions, performers most often work as a corps de ballet (chorus). However, a group of selected dancers may do special numbers, and a very few top artists do solo work.

Many dancers combine their stage work with full-time teaching in schools of the dance or in colleges and universities. The few dancers who become choreographers create new ballet or dance routines. Others are dance directors who train dancers in new productions.

(This statement does not include

instructors of ballroom and other social dancing.)

Places of Employment

About 4,000 dancers worked on the stage, screen, and television in the United States in 1972. Many more teach at schools of the dance and in other schools and colleges. A few teachers, trained in dance therapy, work in mental hospitals. About 90 percent of all dancers are women, but in some types of dance, particularly ballet and modern, women constitute only about one-half of the performers.

Dancing teachers are located chiefly in large cities, but many smaller cities and towns have schools of the dance. New York City is the hub for the majority of performing

dancers; others are situated in most large cities.

Training and Other Qualifications

Serious training for a dancing career traditionally begins by age 12 or earlier. For example, girls who wish to become ballet dancers should begin taking lessons at the age of 7 or 8. From 2 to 3 years of prior preparation is needed before the young girl should start dancing "en pointe." Professional training in ballet typically takes from 10 to 12 lessons a week for 11 or 12 months in the year and many additional hours of practice. The length of the training period depends on the student's ability and physical development, but most dancers have their professional audition by age 17 or 18.

The selection of a professional dancing school is important for two reasons. First, the school must use expert judgment in setting the pace of training, since too early and too severe exercise can permanently damage the legs and feet. Second, the school's connections with producers may help the students obtain employment.

Because of the strenuous training in professional schools, a student's general education may not exceed the legal minimum. However, a dancer's education should include a study of music, literature, and history to help in the interpretation of dramatic episodes and music.

About 200 colleges and universities confer bachelor's degrees on students who have majored in physical education and concentrated on the dance; majored in a dance; or majored in a dance program to prepare students as professional dance artists. Some schools also give graduate degrees.

A college education is an advantage in obtaining employment as a teacher of professional dancing or

choreography. However, dancers who postpone their first audition for openings in classical ballet until graduation may compete at a disadvantage with younger dancers.

Professional schools usually require teachers to have experience as a performer; colleges and conservatories generally require graduate degrees, but experience as a performer often may be substituted. Maturity and a broad educational background also are important.

The dancer's life is one of rigorous practice and self-discipline. Good health and physical stamina are necessary, both to keep in good condition and to follow the rugged travel schedule imposed on many dancers.

Height and body build should not vary much from the average. Good feet and normal arches also are required. Above all, one must have a natural aptitude for dancing, and a creative ability to express oneself through dance.

Seldom does a dancer perform unaccompanied. Therefore, young persons who consider dancing as a career should be able to function as part of a team. They also should be prepared to face the anxiety of unstable working conditions brought on by show closings and audition failures.

Except for outstanding stars, women past 30 are rarely hired by ballet companies, and women past 25 are rarely hired for Broadway shows unless they have had experience in such productions. Men in ballet and men and women in modern dance can usually work longer than other dancers. After the employable age for performers has passed, some dancers teach in colleges or conservatories or establish their own schools. The few who become choreographers or dance directors can continue to work as long as persons in other occupations.

Employment Outlook

Opportunities in this field will be limited both by the small number of full-time jobs available and the relatively large supply of applicants. The supply of trained dancers has exceeded the demand for many years. The irregular nature of employment is expected to persist despite recent union-management steps to guarantee full or near full employment each year.

Adversely affecting the demand for dancers is the decline in the number of stage productions because of competition from motion pictures and television and foreign competition (especially in ballet). Few stage shows run more than 26 weeks and many "fold" after the first week. On the other hand, more industrial exhibitions, auto shows, and state fairs are being produced and a growing trend toward using professional dancers at these events is evident. Also, some new professional dance companies are being developed and television will offer a first employment opportunities. Civic and community dance groups are increasing in number, and opportunities for dancers will expand as these develop into professional groups. Nevertheless, employment opportunities for dance performers are expected to remain limited, and most of the openings for dancers in the years ahead will stem from the need to replace those who leave the field.

Dancers who have the personal and educational qualifications for teaching will have more employment opportunities than those trained only as performers. The growing interest in the dance as one of the fine arts is contributing to the demand for teachers of dancing.

Earnings and Working Conditions

Dancers who perform profes-

sionally are members of one of the unions affiliated with the Associated Actors and Artists of America (AFL-CIO). Dancers who perform in opera ballet, classical ballet, and the modern dance belong to the American Guild of Musical Artists, Inc.; those who perform on live television belong to the American Federation of Television and Radio Artists; those who perform in films, T.V., and other forms of motion pictures belong to the Screen Actors Guild or the Screen Extras Guild; and those who appear in musical comedies join Actors' Equity Association. Dancers also may be members of other unions, depending upon the fields in which they perform. Minimum salary rates, hours of work, and other conditions of employment are specified in basic agreements signed by the unions and the producers. The separate contract signed by each dancer with the producer of the show may be more favorable than the basic agreement regarding salary, hours of work, and working conditions.

The minimum salary for dancers in ballet and other stage productions was about \$170 a week in 1972. The single performance rate is \$68.00 for a solo dance and \$37.00 per dancer for a group. Dancers on tour received an allowance of \$15 a day in 1972, to defray the cost of room and board. The employer pays the cost of transportation. If a dancer signs a contract for a brief appearance in a performance on television or a few days' work in a movie, the minimum rate is higher, relative to time worked. However, this difference is offset by the brevity of the engagement and the long period likely to be spent waiting for the next one. A few performers, of course, have much higher salaries.

Some dancers qualified to teach in schools of the ballet combine this work with engagements as perform-

ers. Many more dancers have to supplement their incomes by other types of work.

Salaries of teachers in the technical schools of the ballet vary with the location and prestige of the school. Dance teachers in college and universities are paid on the same basis as other faculty members. (See statement on "College and University Teachers.")

The normal workweek is 30 hours (five hours per day maximum) spent in rehearsals and matinee and evening performances. Extra compensation is paid for additional hours worked. Most stage performances take place, of course, in the evening, and rehearsals may require very long hours, often on weekends and holidays. When shows are on the road, weekend travel often is required.

Dancers are entitled to some paid sick leave and various health and welfare benefits provided by their unions, to which the employers contribute.

Sources of Additional Information

Information on colleges and universities and conservatories of music which give a major in the dance or some courses in the dance, as well as details on the types of courses and other pertinent information is available from the American Association for Health, Physical Education and Recreation, a division of the National Educational Association, 1201 16th Street, NW., Washington, D.C. 20036.

MUSICIANS

(D.O.T. 152.028 and 152.048)

Nature of the Work

Professional musicians—whether they play in a symphony orchestra, dance band, rock group, or jazz combo—generally have behind them many years of formal or informal study and intensive practice. As a rule, musicians specialize in either popular or classical music; only a few play both types professionally.

Musicians who specialize in popular music usually play the trumpet, trombone, clarinet, saxophone, organ, or one of the "rhythm" instruments—the piano, string bass, drums, or guitar. Dance bands play in nightclubs, restaurants, and at special parties. The best known bands, jazz groups, rock groups, and solo performers sometimes give concerts and perform on television.

Musicians who specialize in classical music play in symphonies, opera and theater orchestras, and for other groups that require orchestral accompaniments. The instruments played by most of these musicians are the strings, brass, and woodwinds. Some form small groups—usually a string quartet or a trio—to give concerts of chamber music.

Many pianists accompany vocal, instrumental soloists, or choral groups or provide background music in restaurants or other places. Most organists play in churches; often they direct the choir. A few exceptionally brilliant musicians become well-known concert artists. They give their own concerts and appear as soloists with symphony orchestras. Both classical and popular musicians often make recordings, either individually or as members of a group.

A very high proportion of all musicians teach in the Nation's schools



and colleges. These teachers may be members of the faculty of music schools or conservatories or of colleges which offer instruction in instrumental and vocal music. Some are music teachers in elementary or secondary schools where they direct vocal and instrumental music programs, teach general classroom music appreciation, and give group instruction on an instrument. Private lessons are given by many teachers employed by school systems, and by performing musicians, either in their own studios or in pupil's homes.

A few musicians work in the field of music therapy in hospitals, and in music libraries.

Places of Employment

About 85,000 persons worked as

performing musicians in 1972. Many thousands more taught in elementary and secondary schools and in colleges and universities. Moreover, almost every town and city has at least one private music teacher.

Most professional musicians who perform work in cities where the Nation's entertainment and recording activities are concentrated, such as New York, Chicago, Los Angeles, Nashville, Miami Beach, and New Orleans. Many perform with one of the 29 major symphonies, 80 metropolitan, or 1,100 community orchestras. Dance bands and civic orchestras also are located in many communities, although in the smaller towns, their members usually are part-time musicians with other regular jobs.

In addition to the people primarily employed as musicians or music teachers, thousands of qualified instrumentalists have other full-time jobs and only occasionally work as musicians. Most of these part-time musicians belong to dance bands, that are hired to play at private parties or for special occasions. Others, with a background in classical music, play occasionally in an orchestra, become conductors or composers, or do some part-time teaching.

Training and Other Qualifications

Most people who become professional musicians begin studying an instrument at an early age. To achieve a career as a performer or as a music teacher, young people need intensive training—either through private study with an accomplished musician, in a college or university which has a strong music program, or in a conservatory of music. They need to acquire not only great technical skill but also a thorough knowledge of music, and they must learn how to interpret music. Before a young person can qualify for ad-

vanced study in a music conservatory or in a college or university school of music, an audition frequently is necessary. Many teachers in these schools are accomplished artists who will train only promising young musicians.

More than 660 conservatories of music and college and university schools of music offer a bachelor's degree program in music education. Students who complete these programs can qualify for the State certificate required for elementary and secondary school positions. About 400 conservatories and collegiate music schools accredited by the National Association of Schools of Music award the degree of bachelor of music to students who major in instrumental or vocal music. Both of these programs provide not only training in performance but also a broad background in musical history and theory, together with some liberal arts courses. Advanced degrees usually are required for college teaching positions, but exceptions may be made for especially well-qualified artists.

Musicians who play jazz and other popular music must have an understanding of and feeling for that style of music, but skill and training in classical styles may expand their employment opportunities. As a rule, they take lessons with private teachers when young, and seize every opportunity to play in amateur or professional performances. Some groups of young people form their own small dance bands or rock groups. As they gain experience and become known, the players may have opportunities to audition for other local bands, and still later, for the better known bands and orchestras.

Young persons who consider careers in music should have both musical talent and creative ability. They also should have poise and stage presence to face large audi-

ences. Since quality of performance requires constant study and practice, self-discipline is vital. Moreover, musicians who do concert and nightclub engagements, must have physical stamina because of constant travel and rugged time schedules that often include long night hours.

Employment Outlook

The music performance field is expected to remain overcrowded through the mid-1980's. Opportunities for concerts and recitals are not numerous enough to provide adequate employment for all the pianists, violinists, and other instrumentalists qualified as concert artists. Competition usually is keen for positions which afford some stability of employment such as jobs with major orchestras and teaching positions in conservatories and colleges and universities. Because of the ease with which a musician can enter private music teaching, the number of music teachers has been more than sufficient to give instruction to all the young persons seeking lessons, and probably will continue to be. Although many opportunities are expected for single and short-term engagements, playing popular music in night clubs, theaters, and other places, the supply of qualified musicians who seek such jobs is likely to exceed demand. On the other hand, first-class, experienced accompanists and well-trained, outstanding players of stringed instruments are likely to remain relatively scarce.

Employment of music performers is expected to increase slightly through the mid-1980's. Although the number of civic orchestras in smaller communities has been growing steadily, many of these orchestras provide only part-time employment for musicians who work chiefly as teachers or in other occupations.

Moreover, openings created by these orchestras have been more than offset by the decline in opportunities for musicians in theater, radio, and motion pictures. The increased use of recorded music has led to the decline of opportunities in these areas. Additional employment opportunities are expected from the expanded use of cable TV (pay TV) and wider use of video cassettes.

The employment outlook in music education for people who are qualified as teachers as well as musicians is better than for those qualified as performers only. However, the supply of music teachers in the Nation's schools is adequate—a situation which is likely to continue through the 1980's.

Earnings and Working Conditions

The amount received for a performance by either classical or popular musicians depends to a large extent on their professional reputations. Musicians who were members of 1 of the 29 major symphony orchestras in the United States received minimum salaries that ranged from about \$170 to \$340 a week in 1972, according to the American Symphony Orchestras League, Inc. Seven orchestras—New York, Boston, Philadelphia, Cleveland, Cincinnati, Houston, and Chicago—have year-round seasons (52 weeks) and minimum salaries ranging from \$10,000 to \$17,700. The other major symphony orchestras have seasons ranging from 34 to 54 weeks.

Musicians who played on half-hour TV shows received a minimum of \$72.45 in 1972 (includes 2-hour rehearsal time). The minimum scale for recording is \$90 for a 15-minute tape (3 hours actual taping time).

The salaries of public school music teachers are determined by the salary schedule adopted for all teachers.

(See statements on Elementary and Secondary School Teachers elsewhere in the *Handbook*.) Many give private music lessons to supplement their earnings. However, earnings are uncertain and vary according to the musician's reputation, the number of teachers and students in the locality, and the economic status of the community.

Musicians customarily work at night and on weekends. They also must spend considerable time in practice and in rehearsal.

Many musicians, primarily those employed by symphony orchestras, work under master wage agreements, which guarantee a season's work up to 52 weeks. Musicians in other areas, however, may face relatively long periods of unemployment between jobs. Thus, the overall level of their earnings generally is lower than that of many other occupations. Moreover, they do not usually work steadily for one employer. Consequently, some performers cannot qualify for unemployment compensation, and few have either sick leave or vacations with pay.

Most musicians who play professionally belong to the American Federation of Musicians (AFL-CIO). Concert soloists also belong to the American Guild of Musical Artists, Inc. (AFL-CIO).

Sources of Additional Information

For information about wages, hours of work, and working conditions for professional musicians, contact:

American Federation of Musicians
(AFL-CIO), 641 Lexington Ave.,
New York, N.Y. 10022.

Information about the requirements for certification of organists and choir masters is available from:

American Guild of Organists, 630
Fifth Avenue, New York, N.Y.
10020.

A list of accredited schools of music is available from:

National Association of Schools of
Music, One Dupont Circle, NW.,
Washington, D.C. 20036.

Further information about music teaching in elementary and secondary schools is available from:

Music Educators National Conference, The National Education Association, 1201 16th St., NW.,
Washington, D.C. 20036.

SINGERS

(D.O.T. 152.028 and .048)

Nature of the Work

Professional singing is an art that usually requires not only a fine voice but also a highly developed technique and a broad knowledge of music. A small number of singing stars make recordings or go on concert tours in the United States and abroad. Somewhat larger numbers of singers obtain leading or supporting roles in operas and popular music shows, or secure engagements as concert soloists in oratorios and other types of performances. Some singers also become members of opera and musical comedy choruses or other professional choral groups. Popular music singers perform in musical shows of all kinds—in the movies, on the stage, on radio and television, and in nightclubs and other entertainment places. The best known popular music singers make and sell many recordings.

Since most singers of both classical and popular music have only part-time or irregular employment they often have full-time jobs of other types and sing only in the evenings or



on weekends. Some give private voice lessons. A number of singers teach general music courses and choruses in elementary and secondary schools. Others give voice training or direct choral groups in churches, in music conservatories or in colleges and universities.

Places of Employment

About 36,000 persons worked as professional singers in 1972. Opportunities for singing engagements are mainly in New York City, Los Angeles, Las Vegas, San Francisco, Dallas and Chicago—the Nation's chief entertainment centers. Nashville, Tennessee, a major center for

country and western music, is one of the most important places for employment of singers for "live" performances and recordings. Singers who teach music in elementary and secondary schools, colleges, universities, and conservatories of music are employed throughout the country. Many singers work part-time, chiefly as church singers and choir masters.

Training and Other Qualifications

Young persons who want to perform professionally as singers should acquire a broad background in music, including its theory and history. The ability to dance may be helpful, since singers are sometimes required to dance. In addition, those interested in a singing career should start piano lessons at an early age. As a rule, voice training should not begin until after the individual has matured physically, although young boys who sing in church choirs receive some training before their voices change. Moreover, because of the work and expense of voice training which often continues for years after the singer's professional career has started, a prospective singer must have great determination. An audition before a competent voice teacher to decide whether professional training is warranted is also important.

Young people can prepare for careers as singers of classical music by enrolling in a music conservatory, or a school or department of music connected with a college or university, or by taking private voice lessons. These schools provide not only voice training, but other training needed to understand and interpret music, including music-related training in foreign languages and sometimes dramatic training. Upon completion of a 4-year course of study the graduate may be award-

ed either the degree of bachelor of music, bachelor of science or arts (in music), or bachelor of fine arts.

Young singers who plan to teach music in public elementary or secondary schools need at least a bachelor's degree with a major in music education and must meet the State certification requirements for teachers. Such training is available in over 660 colleges and universities throughout the country. College teachers usually are required to have a master's degree and sometimes a doctor's degree, but exceptions may be made for especially well-qualified artists.

Although voice training is an asset for singers of popular music, many with untrained voices have had successful careers. The typical popular song does not demand that the voice be developed to cover as wide a range on the musical scale as does classical music, and the lack of voice projection may be overcome by use of a microphone.

Young singers of popular songs may become known by participating in amateur and paid performances in their communities. These engagements may lead to employment with local dance bands or rock groups and possibly later with better known ones.

In addition to musical ability, perseverance, an outstanding personality, an attractive appearance, good contacts, and good luck often are required to achieve a singing career. Singers also must have physical stamina in order to adapt to rigorous time and travel schedules which often include working night hours.

Employment Outlook

The employment outlook for singers is expected to remain highly competitive through the mid-1980's, especially among popular singers. Many short-term jobs are expected

in the opera and concert stage, movies, theater, nightclubs, radio and television, dance bands, and other areas—but not enough to provide steady employment for all qualified singers. Singers who can meet State certification requirements may find positions as music teacher.

Employment of singers is expected to increase at a moderate rate through the 1980's. Recorded music has replaced the "live" singer on radio; television performances by singers are limited. However, the demand is growing for singers who record popular music and do commercials for both radio and television advertising. Additional employment opportunities are expected from the expanded use of cable TV (pay TV) and wider use of video cassettes.

A singing career is sometimes relatively short, since it depends on a good voice and public acceptance of the artists, both of which may be affected by age. Due to these circumstances, singers may be subject to unstable employment conditions and the pressure of unreliable financial circumstances.

Earnings and Working Conditions

Except for a few well-known concert soloists, opera stars, top recording artists of popular music, and some singers regularly employed by dance bands, the motion picture industry, and commercial advertising, most professional singers experience difficulty in obtaining regular employment and have to supplement their singing incomes by doing other types of work.

Singers generally work at night and on weekends. Work in the entertainment field is seasonal and few performers have steady jobs.

Singers who appear on 1/2 hour TV programs received a minimum of \$192 in 1972. Singers in opera choruses received between \$35-45 per performance.

Singers who perform professionally usually belong to a branch of the AFL-CIO union, the Associated Actors and Artists of America. Singers who perform on the concert stage or in opera belong to the American Guild of Musical Artists, Inc.; those who sing on radio

or live television or who make phonograph recordings are members of the American Federation of Television and Radio Artists; singers in the variety and nightclub field belong to the American Guild of Variety Artists; those who sing in musical comedy and operettas belong to the Actors' Equity Association; and those who sing in the movies belong to the Screen Actors Guild, Inc.

Sources of Additional Information

Information about accredited schools and departments of music is available from:

National Association of Schools of Music, One Dupont Circle, NW., Washington, D.C. 20036.

For information about music teaching in elementary and secondary schools contact:

Music Educators National Conference, The National Education Association, 1201 16th St. NW., Washington, D.C. 20036.

DESIGN OCCUPATIONS

Good design can improve the appearance and usefulness of the products that we use and the places where we live. It also helps merchants to increase sales by improving the "eye appeal" of their product, showroom, or advertising.

Many design careers require at least a college education. For example, architects must have at least 5 years of college and professional education. Regardless of the amount of formal education they have, it is essential that people in design occupations have creativity and artistic talent, the ability to communicate ideas through their designs, and good business sense. Some design workers, such as industrial designers, need manual dexterity for performing their duties.

Job opportunities in design occupations are expected to increase through the mid-1980's, because personal income and population are growing and the more affluent public is becoming more design conscious.

This chapter describes six design occupations: Architects, commercial artists, industrial designers, interior designers, landscape architects, and urban planners. (Other jobs such as engineer that may require design skills are described elsewhere.)

ARCHITECTS

(D.O.T. 001.081)

Nature of the Work

Attractive buildings improve the physical environment of a com-

munity. But buildings also must be safe and allow people both inside and around them to properly perform their duties. Architects design buildings that successfully combine these elements of attractiveness, safety, and usefulness.

Most architects provide professional services to clients planning a building project. These services begin in the early stages of the project's development and continue until all work is completed.

The architect and client first discuss the purposes, requirements, and cost of a project, as well as any preference on design that the client may have. The architect then prepares a rough design drawing to show the scale and structural relationships of the building.

After making preliminary drawings and discussing them with the client, the architect develops a final design showing the floor plans and the structural details of the project. Architectural design requires many decisions. For example, in designing a school, the architect must decide on the amount of corridor and stairway space that students need to move safely and easily from one class to another; the type and arrangement of storage space, the location and size of classrooms, laboratories, lunchroom or cafeteria, gymnasium, and administrative offices. The design also must conform to local and State building codes, zoning laws, fire regulations, and other ordinances.

The architect then prepares working drawings showing the exact dimensions of every part of the structure and the location of plumbing, heating units, electrical outlets, and air conditioning. Architects also specify the project's building materials, construction equipment, and in some cases, the interior furnishings.

After all drawings are completed, the architect assists the client in selecting a contractor and in

negotiating the contract. As construction proceeds, there are periodic visits to the building site to insure that the contractor is following the design and using the specified materials. The job is not completed until construction is finished, all required tests are made, and guarantees are received from the contractor.

Architects design a wide variety of structures such as houses, churches, hospitals, office buildings, and airports. They also design multi-building complexes for urban renewal projects, college campuses, industrial parks, and new towns. Besides designing structures, architects also may help in selecting building sites, preparing cost and land use studies, and long range planning for site development.

When working on large projects or for large architectural firms, architects often specialize in one phase of the work such as designing, drafting, specification writing, or administering construction contracts. This often requires working with engineers, urban planners, landscape architects, and other design personnel.

Places of Employment

About 37,000 registered (licensed) architects were employed in 1972; fewer than 5 percent were women. Many other unlicensed architectural school graduates work in positions requiring knowledge of architecture, for example, as supervisory or sales personnel with firms in the building industry.

About two-fifths of all architects are self-employed, either practicing individually or as partners. Most of the others work for architectural firms. However, architects also work for builders, real estate firms, and for other businesses that have large construction programs. Some work for



government agencies, often in city and community planning or urban redevelopment. About 1,400 architects work for the Federal Government, mainly for the Departments of Defense, Housing and Urban Development, Interior, and the General Services Administration.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require a license for the practice of architecture, mainly to insure that architectural work which may affect the safety of life, health or property is done by qualified architects. Requirements for admission to the 2-day licensing examination generally include graduation from an accredited architectural school, followed by 3 year's experience in an

architect's office for those with a bachelor's degree, and 2 years of experience for those with a master's degree. As a substitute for formal training, most States accept longer periods of experience (usually 12 years) and successful completion of an equivalency test for admission to the licensing examination.

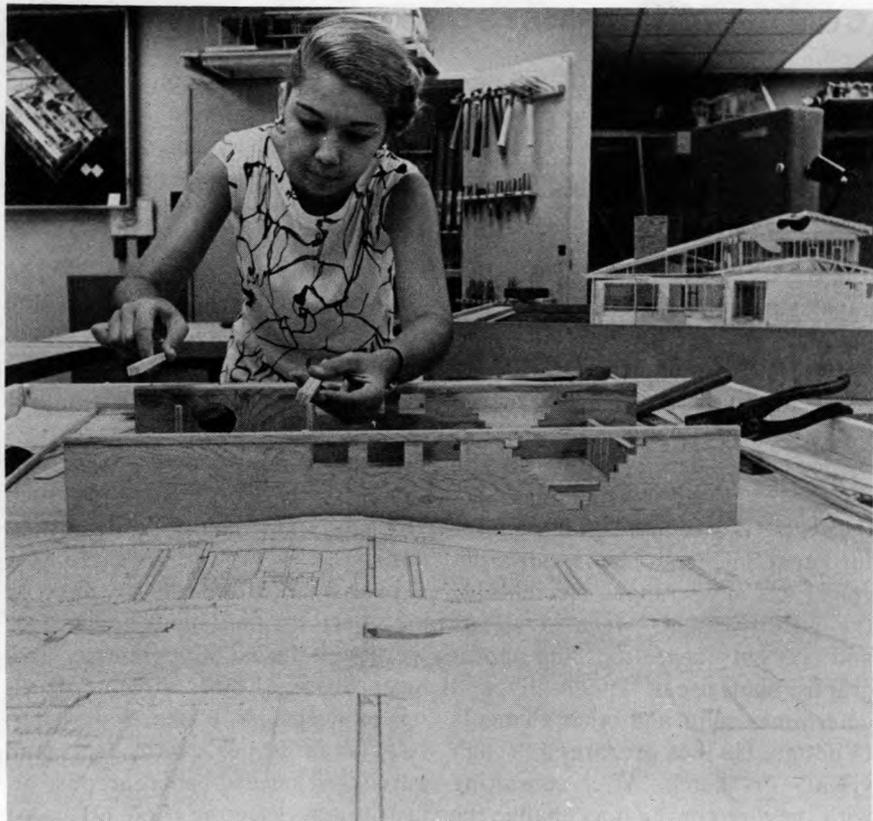
In 1972, 73 of the 89 schools offering professional degrees in architecture were accredited by the National Architectural Accrediting Board. Most of these schools offer a 5-year curriculum leading to a Bachelor of Architecture degree or a 6-year curriculum leading to a Master of Architecture degree. Many architectural schools also offer graduate education for those who already have their first professional degree. While such training is not essential for practicing archi-

tects, it is often desirable for those in research and teaching. Besides professional schools, many junior and community colleges offer 2-year programs in architecture that enable students to transfer to professional degree programs.

Most professional schools of architecture admit qualified high school graduates who meet the entrance requirements of the college or university with which the school is associated. As a general guideline, high school courses should include 4 years of mathematics and English, 3 years of science, 2 years of social sciences and a foreign language, and 1 year of history. A typical college architectural program includes courses in English, mathematics, chemistry, sociology, economics, a foreign language, as well as courses in architectural theory, design, graphics, engineering and urban planning.

Persons planning careers in architecture should be able to work independently, have a capacity for solving technical problems, and be inclined toward artistic creation. They also must be prepared to work in the competitive environment of business where leadership and ability to work with others are important. A person planning a career in architecture should be interested in social studies and have a strong desire to serve the public since architectural work affects people's life, health, and safety. Working for architects or building contractors during summer vacations also is useful to gain knowledge of the practical problems of the profession.

New graduates usually begin as junior draftsmen in architectural firms, where they make drawings and models of structures under the direction of a registered architect. After several years of experience, they may advance to chief or senior draftsmen responsible for all major



Architect constructs a model of building.

details of a set of working drawings and for supervising other draftsmen. Others may work as designers, construction contract administrators, or specification writers who prepare directions explaining the architect's plan to the builder. Employees who are particularly valued by their firm may become associates and receive, in addition to a salary, a share of the profits. Usually, however, the architect's goal is to establish a private practice.

Employment Outlook

Employment opportunities for architects are expected to be favorable through the mid-1980's. Several thousand openings will occur annually due to very rapid growth of the profession and to replace those who die, retire or transfer to other fields of work. Job opportunities are

expected to increase most rapidly in new areas of work because of expanded need in business and government for people with professional design training. Openings for positions with established architectural firms and opportunities for starting a private practice are expected to grow more slowly.

A major factor contributing to the prospective rapid increase of employment for architects is the expected growth of nonresidential construction—the major area of work for architects. Architects will be required not only because of growth in nonresidential construction but also because of the increasing size and complexity of modern buildings. Homeowners' growing awareness of the value of architects' services and the increasing involvement of architects in planning and designing residential communities also should in-

crease openings for architects. Since enrollments in college architectural programs are projected to rise in the years ahead, there should be additional requirements for architects to teach in colleges and universities.

Growing public concern about the quality of physical environments is expected to increase the demand for urban redevelopment and city and community environmental planning projects. This demand should create new job opportunities for architects in a wider range of fields than in the past. Some may be needed in research to develop new tools, materials, and systems for the construction industry. Still others may find employment in manufacturing and construction companies in areas such as design, sales, and administration. Government agencies also will provide opportunities for architects as they become more involved in environmental design and planning. (See statement on Urban Planners elsewhere in the *Handbook*.)

Earnings and Working Conditions

In private industry, starting salaries for new architectural school graduates are generally between \$125 and \$175 a week in 1972, according to the limited information available. Draftsmen with 2 or more years of experience earned between \$160 and \$260 a week, and job captains (supervisors), specification writers, and other senior employees usually earned between \$245 and \$330 a week. Senior employees often receive yearly bonuses in addition to their salaries.

Architects with well-established private practices generally earn much more than high-paid salaried employees of architectural firms. Although the range in their incomes is very wide, some architects with many years of experience and good

reputations earn well over \$25,000 a year. Young architects starting their own practices may go through a period when their expenses are greater than their incomes.

Depending on their college records, architects having a bachelor's degree and no experience could start in the Federal Government at either \$150 or \$185 a week in early 1973. Architects who have completed all requirements for the master's degree can start at \$225 and those with a Ph.D. at \$320 a week.

Most architects work in well-equipped offices and spend long hours at the drawing board. An architect sometimes has to work overtime to meet a deadline. The routine often is varied by interviewing clients or contractors, and discussing the design, construction procedures, or building materials of a project with other architects or engineers. Those involved in contract administration frequently work outdoors during inspections at construction sites.

Sources of Additional Information

General information about careers in architecture including a catalog of publications can be obtained from:

The American Institute of Architecture, 1735 New York Ave., Washington, D.C. 20036.

Information about schools of architecture and a list of junior colleges offering courses in architecture are available from:

The Association of Collegiate Schools of Architecture, Inc., 1735 New York Ave., Washington, D.C. 20036.

COMMERCIAL ARTISTS

(D.O.T. 141.031 and .081, 970.281 and .381, and 979.381)

Nature of the Work

A team of commercial artists often creates the artwork in newspapers and magazines and on billboards, brochures, catalogs, and television commercials. The art director supervises this team of artists with varying skills and specializations. He develops the artistic aspects of an advertising plan. He then turns it over to a layout man for further refinement. The layout artist constructs or arranges elements of the advertisement. He also selects and lays out illustrations and photographs, plans use of typography, and determines color and other elements of design. He then prepares a "rough visual" or sketch. After consulting with the director, he may change the visual and complete a more comprehensive layout for the customer.

A variety of specialists work with the layout man to turn out the finished product. These include *renderers*,

who use magic markers to make rough drafts; *letterers*, who execute appropriate lettering either freehand or with mechanical aids; *illustrators*, who sketch and draw in more finished form; and *paste-up* and *mechanical men*, who cut and paste basic parts of the advertisement or other artwork by using a ruling pen and other drafting tools. Some workers, called *general boardmen*, spend nearly all their time at the drawing board performing many of these specializations. Apprentices help general boardmen or other specialists by doing routine jobs such as separating colors and cutting mats.

In a small office, the art director may perform the layout and boardwork with the aid of apprentices. In a large office, the art director develops concepts with the copywriter; sets standards; deals with clients; and purchases needed photographs, illustrations, lettering, and other art work from freelancers.

Advertising artists create the concept and artwork for a wide variety of items. These include direct mail advertising, catalogs, counter dis-



plays, slides, and film strips. They also design or lay out the editorial pages and features and produce or purchase the necessary illustrations or artwork. Some commercial artists specialize in producing fashion illustrations, greeting cards, or book illustrations, or in making technical drawings for industry.

Places of Employment

About 60,000 persons, two-fifths of them women, worked as commercial artists in 1972. Although some commercial artists can be found in nearly every city, the majority work in large cities, such as New York and Chicago, where the largest users of commercial art are located.

Most commercial artists work as staff artists for advertising agencies, commercial art studios, advertising departments of large companies, printing and publishing firms, textile companies, television and motion picture studios, department stores, and a variety of other business organizations. Many are self-employed or freelance artists. Some salaried commercial artists also do freelance work in their spare time. About 2,500 commercial artists work for Federal Government agencies, principally in the Defense Department. A few teach in art schools.

Training, Other Qualifications, and Advancement

Artistic ability and good taste are the most important qualifications for success in commercial art. However, these qualities must be developed by specialized training in the techniques of commercial and applied art. Education in the fine arts—painting, sculpture, or architecture—and in academic studies generally provides a good foundation for obtaining employment in commercial art, and may be es-

sential for promotion.

The most widely accepted training for commercial art is the instruction given in art schools or institutes that specialize in commercial and applied art. To enter art school, an applicant must usually have a high school education. Some schools admit only applicants who submit acceptable work samples. The course of study, which may include some academic work, generally takes 2 or 3 years, and a certificate is awarded on graduation. A growing number of art schools, particularly those in or connected with universities, require 4 years or more of study and confer a bachelor's degree—commonly the bachelor of fine arts (B.F.A.). In these schools, commercial art instruction is supplemented by liberal art courses, such as English and history. Limited training in commercial art also may be obtained through public vocational high schools and practical experience on the job. However, supplemental training usually is needed for advancement.

The first year in art school may be devoted primarily to the study of fundamentals—perspective, design, color harmony, composition—and to the use of pencil, crayon, pen and ink, and other art media. Subsequent study, generally more specialized, includes drawing from life, advertising design, graphic design, lettering, typography, illustrations, and other courses in the student's particular field of interest. Artistic judgment, imagination, and ability to visualize ideas on paper are basic requirements for a successful career in commercial art.

The various specialities, however, differ in some of the specific abilities required. For example, letterers and retouchers must do precise and detailed work that requires excellent coordination, whereas illustrators and designers need imagination, a distinctive art style, and, in most

cases, the ability to draw well. Some experience with photography, typography, and printing production is useful in art direction or design. Freelance commercial artists must sell both ideas and finished work to clients. A knowledge of type specifications and printing production methods is very helpful. A business sense and responsibility in meeting deadlines are assets, also. Art directors need a strong educational background in art and business practices and the liberal arts. Advertising art directors require a special kind of creativity—the ability to conceive ideas that will stimulate the sale of the client's products or services.

Beginning commercial artists usually need some on-the-job training to qualify for other than strictly routine work. Advancement is based largely on the individual's artistic talent, creative ability, and education. After considerable experience, many salaried commercial artists leave to do freelance work. Most illustrators are freelancers; many of them have an agent.

Commercial artists usually assemble their best artwork into a "portfolio," to display their work. A good portfolio is essential in obtaining initial employment and freelance assignments as well as for job changes.

Usually, commercial artists are able to see the results of their work.

Employment Outlook

Talented and well-trained commercial artists are expected to have favorable opportunities for employment and advancement in most kinds of work through the mid-1980's. However, young people with only average ability and little specialized training probably will encounter competition for beginning jobs and have limited opportunity for advancement.

Employment of commercial artists is expected to increase moderately through the 1980's, however. One reason is an anticipated increase in business expenditures for visual advertising such as television graphics, packaging design, and poster and window displays. The expanding field of industrial design also is expected to require more qualified artists to do three-dimensional work with engineering concepts. (See statement in *Industrial Designers*.) In addition, several thousand jobs for commercial artists are expected to be open each year through the mid-1980's as a result of employment growth and to replace workers who will die, retire, or leave the field for other reasons.

The demand for commercial artists is expected to vary by specialization. For example, demand for pasteup and mechanical artists is expected to increase slightly; jobs for designers, art directors, and layout men will be fewer, much sought after, and open only to experienced, highly talented, and creative artists.

Earnings and Working Conditions

In 1972, beginning commercial artists having no training beyond vocational high school typically earned from \$80 to \$85 a week; graduates of 2-year professional schools, about \$90 a week; and graduates of 4-year post-high school programs, \$90 to \$100 a week, according to the limited data available. Talented artists who had strong educational backgrounds and good portfolios, however, started at higher salaries. After a few years of experience, qualified artists may expect to earn \$125 to \$200 a week or more. Art directors, designers, executives, well-known freelance illustrators, and others in top positions generally have much higher earnings, from \$300 to \$400 a

week or more.

Earnings of freelance artists vary widely, since they are affected by factors such as skill level, variety, and popularity of work. In general, in 1972, freelancers received from \$25 for a single black-and-white fashion sketch to \$750 for a figure in full color with a background; from \$1,000 to \$2,000 for a color cover for a national magazine; or from \$75 to \$300 for a book jacket or record album. Freelance artists may be paid by the hour or by the assignment. Experienced pasteup and mechanical artists may earn between \$4 and \$8 an hour.

Salaried commercial artists generally work 35 to 40 hours a week, but sometimes they must work additional hours and under a considerable amount of pressure in order to meet deadlines. Freelance artists usually have irregular working hours.

Sources of Additional Information

Information on employment opportunities in commercial art is available from:

National Art Education Association,
National Education Association,
1201 16th St. NW., Washington,
D.C. 20036.

INDUSTRIAL DESIGNERS

(D.O.T. 142.081)

Nature of the Work

When someone buys a product, whether it's a home appliance, a new car, or a ball point pen, he wants it to be attractive as well as useful. In-

dustrial designers combine artistic talent with knowledge of marketing, materials, machines, and methods of production to improve the appearance and functional design of products.

Since the consuming public has wide choices of styles in products such as radios, television sets, and furniture, a primary objective of the industrial designer is to design a product that competes favorably with similar goods on the market. A successfully designed consumer product must have an attractive appearance, be easy to use, and coordinate well with related products while having its cost of manufacture as low as possible. Besides consumer products, industrial designers work with industrial, medical, and scientific equipment. Frequently, they redesign these products to make them easier to use.

As the first step in their work, industrial designers study the product and competing products to determine the different ways in which the product may be used. Then they sketch a variety of possible designs and consult with others, such as engineers, production supervisors, and sales and market research personnel, for their opinions on the practicability and sales appeal of each idea.

After company officials select the most suitable design, a model is made. In some firms this model is made by the industrial designer, in others by professional modelers. The first model of a new design is often made of clay so the designer can easily change it. The final or working model is usually made of the material to be used in the finished product. If the model is approved in this form, it is put into production.

Some industrial designers seek to create favorable public images for companies and for government-provided services such as transporta-

tion, by developing trademarks or symbols that appear on the firm's product, advertising, brochures, and stationery. Some design containers and packages which must both protect and promote their contents. Others prepare small exhibits for display purposes or design the entire layout for industrial fairs. Some design the interior layout of special purpose commercial buildings such as restaurants and supermarkets.

Industrial designers employed by a manufacturing company usually work only on the products made by their employer, but this too can vary from filling the day-to-day design needs of the company to long-range planning for new products. Designers who work as consultants to more than one industrial firm may plan and design a great variety of products.

Places of Employment

About 10,000 persons—mostly men—worked as industrial designers in 1972. Most worked for large manufacturing companies or design consulting firms. Others did freelance work, or were on the staffs of architectural and interior design firms.

Industrial designers in consulting firms work mainly in large cities. For example, New York, Chicago, Los Angeles, and San Francisco have the largest number of design consulting organizations. Those in industrial firms work in the manufacturing plants of their companies, which often are located in small—and medium—size cities.

Training, Other Qualifications, and Advancement

Completing a course of study in industrial design in an art school, the design or art department of a university, or a technical college is the usual requirement for entering this field of work. Persons from other

fields, however, notably engineering, architecture, and fine arts, may qualify as industrial designers if they have appropriate experience and artistic talent. Most of the large manufacturing firms will only hire industrial designers who have a bachelor's degree in the field.

In 1972, over 60 colleges and art schools offered programs or courses in industrial design. The Industrial Designers Society of America recognizes 25 of these programs as effective in preparing average students for employment as industrial designers.

Formal education in industrial design at the college or university level usually takes 4 years to complete; a few schools require 5 years of study. These schools award a bachelor's degree in industrial design or fine arts; some also award a master's degree.

Entrance to a course of study in industrial design is limited, with rare exceptions, to qualified high school graduates; in addition, some schools require students to present sketches and other examples of their artistic ability.

Industrial design programs differ considerably among schools. Some stress the engineering and technical aspects of the field, while others give students a strong background in art. In a typical industrial design program much time is spent in the major design lab, where the student can practice designing objects in three dimensions. In the studio course, students learn to make working drawings and models with clay, wood, plaster, and other easily worked materials. In schools that have the necessary machinery, students gain experience in making models of their designs while learning to use metalworking and woodworking machinery. Students also take basic and abstract art and sculpture courses. Some schools require courses in

basic engineering and composition of materials. Courses in business administration and merchandising can be helpful in getting a job.

Industrial designers must have creative talent, drawing skills, and the ability to see familiar objects in new ways. They must also understand the needs and tastes of the public, rather than design only to suit their own artistic sensitivity. Designers should not be easily discouraged when their ideas are rejected—often designs must be resubmitted many times before one is accepted. Since industrial designers are required to cooperate with engineers and other staff members, the ability to work and communicate well with others is important. Those who plan to practice industrial designing on a consulting basis should understand business practices and have sales ability.

Applicants for jobs should assemble a "portfolio" that demonstrates their creative talent and ability to communicate ideas through drawings and sketches.

New graduates of industrial design courses frequently start as assistants to experienced designers. They are usually given relatively simple design assignments. As they gain experience, designers may be assigned to supervisory positions with major responsibility for the design of a product or a group of products. Those who have an established reputation in the field, as well as the necessary funds, may start their own consulting firms.

Employment Outlook

New entrants trained specifically in industrial designing may face competition for beginning jobs from persons with engineering, architectural, and related backgrounds who have artistic and creative talent. Employers, however, will actively seek applicants with a design degree and

outstanding talent.

Employment in this relatively small occupation is expected to expand slowly but steadily through the mid-1980's. Growing population and rising incomes will create markets for newly designed products. This creates jobs for industrial designers because as in the past, manufacturers will strive to increase their sales through creating new products, improving existing ones, and improving the packaging and appearance of their products.

Frequent redesign of household products, automobiles, and industrial equipment has always created a need for designers. However, recently there has been some indication of a trend away from annual style changes which may somewhat lessen demand for industrial designers.

Small companies probably will make increasing use of services offered by industrial design consulting firms to compete more effectively with larger firms. However, some of these services, such as trademark and package design, could be offered by advertising agencies as well as industrial design consultants.

Some employment opportunities also will arise each year from the need to replace designers who die, retire, or leave the field.

Earnings and Working Conditions

Starting salaries for inexperienced industrial designers with a bachelor's degree generally ranged from \$7,000 to \$10,000 a year in 1972, according to limited data. After several years experience, it is possible to earn \$10,000 to \$15,000 a year. Salaries of those with many years of experience averaged about \$20,000 a year, but varied greatly depending on factors such as individual talent and the size and type of firm in which they work.

Earnings of industrial designers who own their consulting firms, alone or as members of a partnership, may fluctuate markedly from year to year. In recent years, earnings of most consultants were between \$20,000 and \$30,000 and heads of large well-known firms earned considerably more.

Sources of Additional Information

A brochure about careers and a list of schools offering courses and degrees in industrial design are available, for 50 cents from:

Industrial Designers Society of America, 1750 Old Meadow Rd., McLean, Va. 22101.

INTERIOR DESIGNERS

(D.O.T. 142.051)

Nature of the Work

The creative work of interior designers, sometimes called *interior decorators*, helps make our living, working, and playing areas more attractive and useful. Interior designers plan and supervise the design and arrangement of building interiors and furnishings. They help clients select furniture, draperies, other fabrics, floor coverings, and accessories. They also estimate what any work or furnishings will cost. Interior designers may do "boardwork", particularly on large assignments. This boardwork includes work on floor plans and elevations and the preparation of sketches or other perspective drawings so clients can visualize their plans. After the client approves both the plans and the cost, the designer may make arrangements for buying the furnishings; for supervising the work of

painters, floor finishers, cabinet makers, carpet layers, and other craftsmen; and for installing and arranging the furnishings.

Many large department and furniture stores have separate design departments to advise their customers on decorating and design plans. The main purpose of the designers in these departments is to help sell the store's merchandise, although materials from outside sources may be used occasionally when they are essential to the plans developed for the customer. Department store designers frequently advise the store's buyers and executives about style and color trends in interior furnishings.

Interior designers may work on private homes or commercial buildings. Those who specialize in commercial structures often work for clients on large design projects such as the interiors of entire office buildings, hospitals, and libraries. Generally their plans include the complete layout of the rooms within the space allowed by the exterior walls and other framework. Sometimes they redesign or renovate the interiors of old buildings. When their plans have been completed, an architect checks them against building plans to assure compliance with building requirements and to solve structural problems. Some interior designers also design the furniture and accessories to be used in interiors, and then arrange for their manufacture. A few interior designers have unusual jobs such as designing interiors of ships and aircraft, while others design stage sets used for motion pictures or television.

Places of Employment

About 18,000 persons—half of them men—worked as interior designers in 1972. Additional persons worked in this field on a part-



time basis. Most workers in this occupation are employed in large cities.

Some interior designers own their own establishment, either alone or as members of a firm with other designers. Many sell some or all of the merchandise with which they work. Designers may work independently or as assistants and sometimes have large staffs, including salespersons.

Other interior designers work in large department or furniture stores, and a few have permanent jobs with hotel and restaurant chains. Some work for architects, furniture suppliers, antique dealers, furniture and textile manufacturers, or other manufacturers in the interior furnishing field.

Interior designers may work for magazines that feature articles on

home furnishings. Some large industrial corporations employ interior designers on a permanent basis.

Training, Other Qualifications, and Advancement

Formal training in interior design is becoming increasingly important for entrance into this field of work. Most department stores, well established design firms, and other major employers will accept only professionally trained people for beginning jobs. In 1972, 15 schools offered 2-year programs leading to an Associate Degree in Interior Design, seven schools had 3-year programs, 66 colleges and universities offered a bachelor's degree in the field, and 23 had programs leading to a master's degree or the Ph.D. The course of

study usually includes the principles of design, history of art, freehand and mechanical drawing, painting, study of the essentials of architecture as they relate to interiors, design of furniture and exhibitions, and study of various materials, such as woods, plastics, metals, and fabrics. A knowledge of furnishings, art pieces, and antiques is important. In addition, courses in salesmanship, business procedures, and other business subjects are valuable.

Membership in either the American Institute of Interior Designers (AID) or the National Society of Interior Designers (NSID), both professional societies, is a recognized mark of achievement in this profession. Membership usually requires the completion of 3 or 4 years of post-high school education; the major emphasis should be on training in design. Another requirement is several years of practical experience in the field, including supervisory work.

Young people starting in interior design usually serve a training period, either with design firms, in department stores, or in furniture stores. They may act as receptionists, as shoppers with the task of matching materials or finding accessories, or as stockroom assistants, assistant decorators, or junior designers. In most instances, from 1 to 5 years of on-the-job training is required before a trainee is considered eligible for advancement to the job of designer. Beginners who do not get trainee jobs often work selling fabric, lamp, or other interior furnishings to gain experience in dealing with customers and to become familiar with the merchandise. This experience often makes getting trainee jobs in design easier; it also may lead to a career in merchandising.

After considerable experience, designers with ability may advance to design department head, interior

furnishings coordinator, or to other supervisory positions in department stores or in large design firms. If they have the necessary funds, they may open their own establishments. Exceptionally talented people can advance rapidly.

Artistic talent—color sense, good taste, imagination—, good business judgement, and the ability to deal with people are important assets for success in this field. Interior designers should be able to work with detail. An advantage to interior design as a career is the satisfaction of seeing the results of one's work.

Employment Outlook

Persons seeking beginning jobs in interior designing probably will face competition through the mid-1980's. Interior designing is a competitive field that requires talent, training, and business ability, and many applicants vie for the better jobs. Talented art school or college graduates who major in interior design will find good opportunity for employment. Those with less talent or without formal training will find it increasingly difficult to enter this field.

Employment of interior designers is expected to increase moderately through the mid-80's. Population growth, more families with high incomes, larger expenditures for home and office furnishings, the increasing availability of well-designed furnishings at moderate prices, a growing recognition among middle-income families of the value of design services, and increasing use of these services by commercial establishments should contribute to a greater demand for these workers. In addition to new jobs, some openings will be created by the need to replace designers who die, retire, or leave the field.

Department and furniture stores are expected to employ an increas-

ing number of designers. These stores also are expected to share in the growing volume of design work for commercial establishments and public buildings, formerly handled almost entirely by independent designers. This development will result in increased opportunities for salaried jobs. However, some stores prefer giving design courses to their salesworkers instead of hiring trained persons. Interior design firms also are expected to continue to expand. Employment of interior designers, however, is sensitive to change in general economic conditions, because people often forego design services when the economy slows down.

Earnings and Working Conditions

Earnings of interior designers vary greatly depending on the parts of the country and the types of firms in which they work. Beginning salaries ranged generally from \$75 to \$100 a week in 1972 for an art school or college graduate having formal training in interior design; some graduates of 3- or 4-year programs received salaries between \$125 and \$150 a week, according to the limited data available.

Some interior designers are paid straight salaries. Some receive salaries and commissions which usually range from 5 to 10 percent of the value of their sales. Others receive commissions only, which may be as much as one-third of the value of their sales.

Many persons who have only average skill in this field earn only moderate incomes—from \$5,000 to \$10,000 a year, even after many years of experience. Talented designers who are well-known in their localities may earn up to \$15,000 or more. Designers who have nationally recognized ability may earn over \$25,000 yearly.

The earnings of self-employed designers vary widely depending on the volume of business, their professional prestige, the economic levels of their clients, their own business competence, and the percentage of wholesale prices they receive from the sale of furnishings.

Hours of work for designers are sometimes long and irregular. Designers usually adjust their workday to suit the needs of their clients, meeting with them during the evenings or on weekends, when necessary.

Sources of Additional Information

For information about careers in interior design and a list of schools offering programs in this field, contact:

National Society of Interior Designers, Inc., 312 East 62nd St., New York, N.Y. 10021.

American Institute of Interior Designers, 730 Fifth Ave., New York, N.Y. 10019.

Foundation for Interior Design Education Research, 1750 Old Meadow Rd., McLean, Va. 22101.

LANDSCAPE ARCHITECTS

(D.O.T. .019.081)

Nature of the Work

Everyone enjoys attractively designed outdoor areas that have an abundance of trees and shade along with grassy open spaces, ponds, and walkways free from dangerous traffic. This attractiveness reflects the skills of landscape architects who see that commercial and recreational areas have useful and natural-looking landscapes.

Landscape architects assist many types of organizations in planning

and designing a project, from a real estate firm starting a new suburban development to a city building an airport or park. They help plan and design the arrangement of trees, shrubbery, walkways, open spaces, and other features of a project's site, and also may supervise the grading, construction, and planting required to carry out the plan.

In planning a site, landscape architects first study the nature and purpose of the project, the funds available for the job, and the various types of proposed buildings. Next they study the site itself, observing and mapping features such as the slope of the land and the position of existing buildings and trees. They also consider the parts of the site that will be sunny or shady at different times of the day, the structure of the soil, existing utilities, and many other factors affecting a landscape's design. Then, after consultation with the architect or engineer working on the project, they draw up plans for the development of the site. If the plan is approved, landscape architects prepare working drawings showing all existing and proposed features such as buildings, roads, walkways, terraces, grading, and drainage structures in planted areas. Landscape architects outline in detail the methods of constructing features and draw up lists of building materials. They then may invite landscape contractors to bid for the work.

Landscape architects help design and supervise a wide variety of projects. Some, however, specialize in certain types of projects such as parks and playgrounds, campuses, hotels and resorts, shopping centers, roads, or public housing. Still others may specialize in certain services such as regional planning and resource management, site selection, feasibility and cost studies, or site construction.

Places of Employment

About 12,000 persons worked as landscape architects in 1972; 10 to 15 percent were women. Most landscape architects are self-employed or work for private architectural, landscape architectural, or engineering firms. Government agencies concerned with public housing, city planning, urban renewal, highways, parks, and recreation, employed about 40 percent of all landscape architects. The Federal Government employed about 600 landscape architects, mainly in the Departments of Agriculture, Defense, Interior, and Housing and Urban Development. Some landscape architects were employed by landscape contractors, and a few taught in colleges and universities.

Training, Other Qualifications, and Advancement

A bachelor's degree in landscape architecture is usually the minimum educational requirement for entering the profession. At least 64 colleges and universities offer this training; 28 of these have accreditation from the American Society of Landscape Architects. Another 36 schools offer courses in landscape architecture, but not complete degree programs. The curriculum for a bachelor's degree requires 4 to 5 years of study depending on the institution. Twelve universities offer a master's degree in landscape architecture.

Entrance requirements for landscape architecture programs are usually the same as those for admission to a liberal arts college. Some colleges require completion of a high school course in mechanical or geometrical drawing, and most schools advise high school students to take courses in art, botany, and more mathematics than the minimum re-

quired for college entrance.

College courses include such technical subjects as surveying, landscape and architectural design, landscape construction, plant materials and design, sketching, recreational and city planning, contracts, specifications, cost estimates, and business practices. Other courses include horticulture and botany as well as English, science, social sciences, and mathematics. Most college programs also include field trips to view and study examples of landscape architecture.

Twenty-six States require a license for independent practice of landscape architecture—Alabama, Arizona, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Nebraska, New York, North Carolina, Ohio, Oregon, Pennsylvania, Tennessee, Texas, Utah, Washington, and West Virginia. Admission to the licensing examination usually requires a degree from an accredited school of landscape architecture plus 2 to 4 years of experience. For admission to the licensing examination, lengthy apprenticeship training (6-8 years) under an experienced landscape architect may be substituted for college training, however, this method is slow and not always acceptable to public agencies.

Persons planning careers in landscape architecture should be interested in art and nature since the work requires a talent for design and an understanding of plant life. Self-employed landscape architects also must understand business practices and be able to deal with others since it is often necessary to bid for contracts. Working for landscape architects or landscape contractors during summer vacations helps a person to understand the practical problems of the profession, and the ex-

perience may be helpful for gaining employment after graduation.

New graduates usually begin as junior draftsmen, tracing drawings and doing other simple drafting work. After gaining experience, they may help prepare specifications and details of construction procedures and handle other aspects of landscape architecture. After 2 or 3 years they usually become qualified to carry a design through all stages of its development. Those who work for private firms and demonstrate exceptional ability in all phases of the work may become associates of the firm; landscape architects who progress this far, however, often open their own office.

Employment Outlook

Employment opportunities for graduates with professional training in landscape architecture are ex-

pected to be favorable through the mid-1980's. Very rapid growth is expected for the profession and additional workers will be needed to replace those who die or retire.

A major factor underlying the increased demand for landscape architects is the growing interest in city and regional environmental planning. Metropolitan areas will require landscape architects to help plan the development of land for the efficient and safe use of their growing populations. Legislation to promote environmental protection could spur demand for landscape architects to participate in planning and designing a growing number of public and private construction projects, particularly for housing, transportation, and outdoor recreation. Rising average incomes and living standards along with increased homeownership will also increase the demand for landscape architects.

Earnings and Working Conditions

In 1972, starting salaries in private firms for new graduates having a bachelor's degree in landscape architecture ranged from about \$8,000 to \$12,000 annually; holders of a master's degree generally earned starting salaries between \$9,500 and \$13,500. Earnings of experienced landscape architects in private firms were very high—\$16,000 to \$21,000 a year in 1972—compared to average earnings of nonsupervisory workers in private industry, except farming.

Landscape architects in independent practice often earn more than salaried employees with considerable experience, but their earnings may fluctuate widely from year to year.

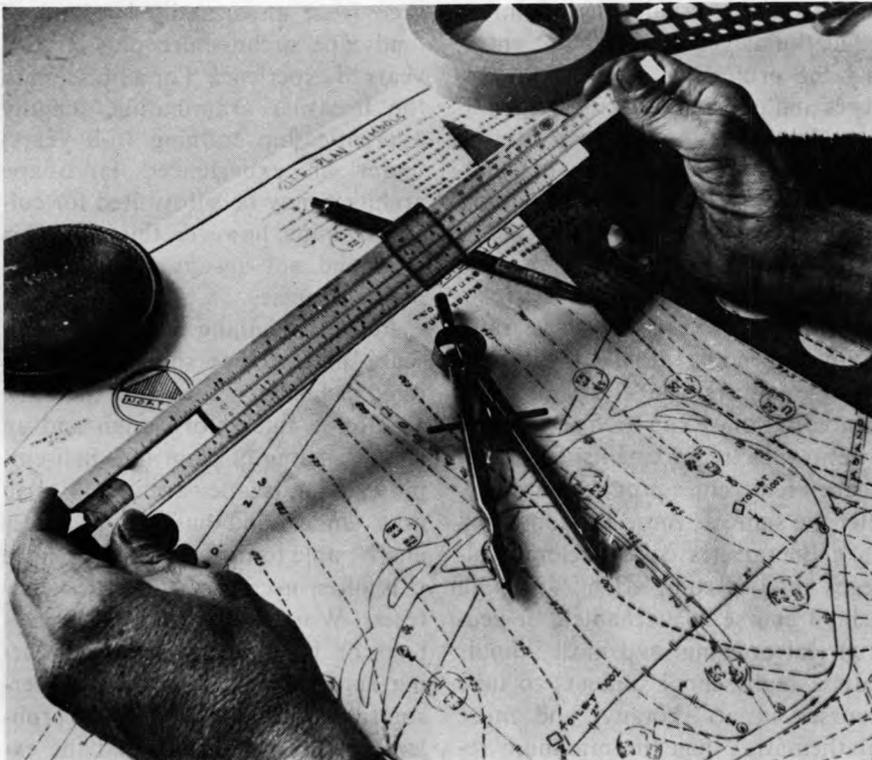
The Federal Government, in early 1973, paid new graduates with a bachelor's degree annual salaries of \$7,694 or \$9,520 depending on their qualifications. Those with advanced degrees had starting salaries ranging from \$11,614 to \$16,682 a year.

Salaried employees both in government and in landscape architectural firms usually work regular hours. Self-employed persons often work long hours. Salaried employees in private firms may also work overtime during seasonal rush periods or to meet a deadline.

Sources of Additional Information

Additional information including a list of colleges and universities offering accredited courses of study in landscape architecture may be obtained from:

American Society of Landscape Architecture, Inc., 1750 Old Meadow Rd., McLean, Va. 22101.



For information on a career as a landscape architect in the Forest Service, write to:

U.S. Department of Agriculture,
Forest Service, Washington, D.C.
20250.

URBAN PLANNERS

(D.O.T. 199.168)

Nature of the Work

Urban planners, sometimes called regional or community planners, develop programs to provide for future growth and revitalization of urban communities. They try to remedy problems such as deteriorating business and residential areas, inadequate park and recreation facilities, and air pollution.

Planners examine community facilities such as health clinics and schools to be sure these facilities can meet the demands placed upon them. They also keep abreast of the legal issues involved in community development and redevelopment and any changes in housing and building codes. Because suburban growth has increased the need for better ways of traveling to the urban center, the planner's job often includes designing new transportation and parking facilities.

Urban planners project future conditions that may develop as a result of population growth or social and economic change, and estimate, for example, the community's long-range needs for housing, transportation, and business and industrial sites. Working within a framework set by the community government, they analyze and propose alternative ways to achieve more efficient and attractive urban areas.

Before drawing plans for long-range community development, ur-

ban planners prepare detailed studies that show the current use of land for residential, business, and community purposes. These reports present information such as the arrangement of streets, highways, and water and sewer lines, and the location of schools, libraries, and playgrounds. They also provide information on the type of industry in the community, characteristics of the population, and employment and economic trends. With this information, urban planners propose ways of using undeveloped land and design the layout of recommended buildings and other facilities such as subways. They also prepare materials that show how their programs can be carried out and the approximate costs.

Urban planners often confer with private land developers, civic leaders, and officials of public agencies that do specialized planning. They may prepare materials for community relations programs, speak at civic meetings, and appear before

legislative committees to explain and defend their proposals.

In small organizations, urban planners must be able to do several kinds of work. In large organizations, planners usually specialize in areas such as physical design, community relations, or the reconstruction of run-down business districts.

Places of Employment

About 12,000 persons—over 90 percent of them men—were urban planners in 1972. Most work for city, county, or regional planning agencies. A growing number are employed by States or by the Federal Government.

Many planners do consulting work, either part time in addition to a regular job, or full time working for a firm that provides services to private developers or government agencies. Urban planners also work for large land developers or research organizations and teach in colleges and universities.



Urban planners discuss community plans.

Training, Other Qualifications, and Advancement

Employers often seek workers who have advanced training in urban planning. Two years of graduate study in city planning, or the equivalent in work experience, are required for most entry jobs in Federal, State, and local government agencies. However, some people who have bachelor's degrees in city planning, architecture, landscape architecture, or engineering may qualify for beginning positions.

In 1972, about 60 colleges and universities gave a master's degree in urban planning. Although students holding a bachelor's degree in architecture or engineering may earn a master's degree after 1 year, most graduate programs in urban planning require 2 or 3 years to complete. Graduate students spend considerable time in workshops or laboratory courses learning to analyze and solve urban planning problems. Students often are required to work in a planning office part time or during the summer while they are earning the graduate degree.

Candidates for urban planner jobs in Federal, State, and local government agencies frequently must pass civil service examinations to become eligible for appointment. These examinations usually are advertised nationally and have no residence restrictions.

Planners must be able to think in terms of spatial relationships and to visualize the effects of their plans and designs. They should be flexible in their approaches to problems. Planners have to cooperate with others and reconcile different viewpoints to achieve the desired goals.

After a few years' experience, urban planners may advance to assignments where they exercise a high de-

gree of independent judgment such as outlining proposed studies or designing the physical layout of a large development. Some are promoted to jobs as planning directors, who spend much time meeting with officials in other organizations, speaking to civic groups, and supervising other professionals. Further advancement is more difficult at this level and often occurs through a transfer to a large city, where the problems are more complex and the responsibilities greater.

Employment Outlook

Employment opportunities for college graduates who major in city and regional planning are expected to be very good through the mid-1980's. Although the number of graduates has been rising in recent years, the shortage of well-qualified planners is expected to continue. The American Society of Planning Officials estimated that in 1972 over 10 percent of all positions in city, county, and metropolitan areas (city and suburbs) were vacant. Although most openings will be for new jobs, some positions will result from the need to replace planners who leave the profession, retire, or die.

This occupation will grow through the 1980's as more communities seek professional planning help in solving problems created by urbanization and population growth. As urban communities continue to spill into neighboring areas, open spaces for recreation will tend to disappear, smog and traffic problems will multiply, and the need for more and better planned facilities will become acute. The construction of new cities and towns and Federal assistance for slum clearance and urban renewal also will stimulate the demand for urban planners.

Earnings and Working Conditions

In 1972, the average salary for inexperienced urban planners with the bachelor's degree was \$9,000 a year; those with the master's degree earned average salaries of \$11,000. Planners with the master's degree and 3 to 4 years' experience had median earnings of \$15,000 a year.

Salaries of directors of planning depend largely on the size of the city where they work. In 1972, the average salary for a planning director in a city of 10,000 to 25,000 people was \$15,600 a year; in cities of over 250,000, the average was \$24,000. Consultants earn fees that vary according to their reputation and previous experience.

In early 1973, the usual entrance salary for urban planners in the Federal Government was \$11,600 a year. In a few cases, individuals having less than 2 years of graduate work or the equivalent were hired as interns at yearly salaries of \$7,700 or \$9,500.

Most planners have sick leave and vacation privileges and are covered by retirement and health plans. Although most city planners have a scheduled workweek of 40 hours, they sometimes work in the evenings and on weekends to attend meetings with citizens' groups.

Sources of Additional Information

Facts about careers in planning and a list of schools offering training are available from:

American Institute of Planners, 917
15th St. NW., Washington, D.C.
20005.

American Society of Planning Officials, 1313 East 60th St., Chicago,
Ill. 60637.

COMMUNICATIONS RELATED OCCUPATIONS

Communication is important among people, either individually as citizens, workers, or employers, or collectively as a group, organization, or government. It enables them to express their thoughts and ideas, and in turn to understand and interpret thoughts and ideas of others. This section of the *Handbook* describes four occupations that specialize in communications—interpreters, technical writers, newspaper reporters, and radio and television announcers.

Interpreters and technical writers work as intermediaries translating messages for people to understand: Interpreters help people understand languages foreign to them, technical writers help people understand technical information. Newspaper reporters and radio and television announcers inform people about current events and happenings that might interest or affect them. Newspaper reporters gather information on events which they describe, analyze, and interpret in newspapers for rapid dissemination to large numbers of people. Radio and television announcers use electronic communications equipment to tell people of products and services they might obtain, current happenings, and other items of interest.

INTERPRETERS

(D.O.T. 137.268)

Nature of the Work

Interpreters help people of different nations and different cultures

overcome the language barriers that separate them by orally translating what has been said by one person into a language that can be understood by others.

There are two basic techniques of interpretation: simultaneous and consecutive. In simultaneous interpretation, the interpreter orally translates what is being said as the speaker continues to talk. This technique requires quickness and fluency, and it is made possible by the use of electronic equipment. Conference interpreters often work in a glass-enclosed booth from which they can see the speaker. While listening through earphones to what is being said, they simultaneously give the translation by speaking into a microphone. People attending the conference who do not understand the language being spoken may tune in to an interpreter's translation by simply pushing a button or turning a dial to get the translation in the language they know. Simultaneous interpretation is generally preferred for large

conferences, and the development of portable equipment has extended its use to situations outside of the formal conference setting.

Consecutive interpretation also involves oral translation. However, the speaker and the interpreter take turns speaking. A consecutive interpreter must have a good memory and generally needs to take notes of what is said to be certain to give a complete translation. The chief drawback of consecutive interpretation is that the process is very time-consuming, since the speaker must wait for the translation before proceeding.

Since interpreters are needed whenever and wherever people find language a barrier, their work may involve a variety of topics and situations. They may be used, for example, to explain to a group of foreign visitors various aspects of the American way of life, such as points of political or social interest, or they may be required to interpret highly technical speeches and discussions for medical or scientific gatherings.



They may work at the United Nations, or find themselves in a courtroom or escorting foreign leaders or businessmen visiting the United States.

Places of Employment

An estimated 150 persons worked full-time as interpreters in the United States in 1972. The largest single concentration of interpreters was at the United Nations in New York where nearly 80 people held full-time posts. Various other international organizations, located primarily in Washington, D.C., also employed regular staff interpreters. Within the Federal Government, the Departments of State and Justice were the major employers of full-time interpreters.

An estimated 450 persons worked as free-lance interpreters. Free-lance interpreters may work for various employers under short-term contracts. About four-fifths were under contract on a temporary basis to the Department of State and the Agency for International Development to serve as escort interpreters for foreign visitors to the United States. Some of these interpreters worked a great portion of the year; others worked for only a few days. The remainder of the free-lance interpreters constituted the free-lance conference field. These interpreters provided for both the supplementary needs of the international and Federal agencies as well as for periodic, short-term needs of various international conferences which are held in this country. Besides persons who work strictly as interpreters, there are many who in the course of their jobs may do some interpretation work.

About one-half of the Nation's conference interpreters are women; most who work as escort free-lances, however, are men.

Training, Other Qualifications, and Advancement

A complete command of two or more languages is the primary requisite for becoming an interpreter. Interpreters must be able to call to mind instantaneously words or idioms corresponding to the foreign ones. An extensive working vocabulary and absolute ease in making the transition from one language structure to another are necessary.

Students who want to become interpreters should acquire expertise in several languages. Interpreters who work at the United Nations, for example, must know at least three of the five official U.N. languages, which are English, French, Spanish, Russian, and Chinese. Portuguese and, to some extent, Japanese and German are also of value to interpreters in the United States.

Two schools in the United States offer programs specifically geared to interpreter training. Both require foreign language proficiency upon entry. The Georgetown University School of Languages and Linguistics in Washington, D.C. has a 1- or 2-year course of study leading to a Certificate of Proficiency. Applicants to Georgetown University must qualify on the basis of an oral aptitude test and satisfactory performance in a basic first-year college program. The Monterey Institute of Foreign Studies in Monterey, California, offers a 2-year program leading to a master's degree in Language and International Studies and a certificate from the Department of Translation and Interpretation. Applicants to the Monterey Institute must have a bachelor's degree with a language major, or its equivalent. Students also must pass a qualifying examination for the Interpreters Certificate Program.

Many individuals qualify for posi-

tions as interpreters principally on the basis of their foreign backgrounds. Consecutive interpreters, for example, employed by the Immigration and Naturalization Service of the U.S. Department of Justice serve primarily in interpreting legal proceedings, such as hearings for aliens. Extensive experience and a broad education are not as crucial in the performance of their duties as these same factors are for other types of interpretation.

Besides being thoroughly competent in languages, interpreters are expected to be generally well informed on a broad range of subjects, often including technical subjects such as medicine or scientific or industrial technology. Work as a translator may serve as a useful background in maintaining an up-to-date vocabulary in various specialized or technical areas. The experience of living abroad also is very important for an interpreter.

Although there is no standard requirement for entry into the profession, a university education usually is considered essential.

People interested in becoming interpreters should be articulate speakers and have good hearing. The tensions of the job dictate that they have emotional stamina. The exacting nature of this profession demands quickness, alertness, and constant attention to accuracy. Working with all types of people requires good sense and tact. It is essential that interpreters maintain confidentiality in their work and that they give honest interpretations.

Advancement in the interpreting field is generally based on satisfactory service. There is some advancement from escort-level interpreting to conference level work.

Employment Outlook

Employment of full-time inter-

preters is expected to remain stable through the mid-1980's. Past experience has shown that any slight or sporadic increase in the demand for interpreters could be met by the existing flexible pool of free-lancers. Almost all new openings for interpreters, therefore, should result from the need to replace those who retire, die, or leave the field for other reasons. Interpreters may expect to face competition for the limited number of positions. Only those who are highly qualified will find favorable employment opportunities.

Qualified interpreters also may find work abroad. For example, the demand for interpreters in Europe, where language represents a significant barrier to communications, is greater than in the U.S.

People who have linguistic abilities also may find employment opportunities as translators. In fact, many interpreters find the ability to do translation work, if not requisite, an occupational asset. Foreign language competence also is important for careers in the fields of foreign service, international business, and language education.

Earnings and Working Conditions

Salaries of interpreters depend upon the type of interpreting done as well as the ability and performance of the individual. The tax-free annual starting salary for conference interpreters at the United Nations was \$9,274 in early 1973. Outstanding U.N. interpreters could expect to earn more than \$20,000. Beginning salaries for interpreters in various other international organizations were about \$9,000 a year, according to the limited information available. In addition, international organizations often paid supplementary living and family allowances.

Junior interpreters who worked

for the U.S. Department of State received salaries ranging from \$9,520 to \$11,614 a year in early 1973. Starting salaries ranged somewhat lower for Government interpreters with limited education, experience, or interpreting skills.

In the free-lance field, interpreters are paid on a daily basis. Conference interpreter salaries ranged from about \$80 to \$100 a day in early 1973, depending on experience. The U.S. Department of State paid a daily salary of \$90. The pay for interpreters at technical and scientific conferences, which generally convene only once a year for a few days, ranged from \$100 to \$125 a day.

Free-lance escort interpreters received salaries ranging from about \$30 to over \$50 a day, based on the individual's skill and prior performance. Interpreters on assignment usually could expect to be paid for a 7-day week. Interpreters are paid transportation expenses by the employing agency and also receive a subsistence allowance to cover the cost of accommodations, meals, and other expenses incidental to their assignments.

The conditions under which interpreters work vary widely. In free-lancing, there is little job security because of demand fluctuations, and the duration of various free-lance assignments ranges from a few days for a typical conference to several weeks for some escort assignments. Although the hours interpreters work are not necessarily long, they are at times irregular. In some instances, especially for escort free-lancers, a great deal of travel to a wide variety of locations is required.

Sources of Additional Information

Information on the interpreting profession is available from:

The American Association of Language Specialists, 1000 Connecticut Ave. NW., Suite 9, Washington, D.C. 20036.

American Society of Interpreters, 1010 Vermont Ave. NW., Room 917, Washington, D.C. 20005.

For information on entry requirements and courses of study at the two schools offering specialized programs for interpreters contact:

Division of Interpretation and Translation, School of Languages and Linguistics, Georgetown University, Washington, D.C. 20007.

Department of Translation and Interpretation, Monterey Institute of Foreign Studies, P.O. Box 1978, Monterey, Calif. 93940.

Information about employment opportunities is available from:

Language Services Division, U.S. Department of State, Washington, D.C. 20520.

Secretariat Recruitment Service, United Nations, New York, N.Y. 10017.

NEWSPAPER REPORTERS

(D.O.T. 132.268)

Nature of the Work

Newspaper reporters gather information on current events and use it to write stories for publication in daily or weekly newspapers. In covering events, they may interview people, review public records, attend news events, and do research. As a rule, reporters take notes or use electronic recording devices while collecting facts, and write their stories upon return to the office. Sometimes, to meet deadlines, they telephone their information or stories to other staff members known



as "rewrite men", who write or transcribe the stories for them.

Large dailies frequently assign some reporters to "beats," such as police stations or the courts, to gather news originating in these places. General assignment reporters handle various types of local news, such as a story about a lost child or an obituary of a community leader. Specialized reporters with a background in a particular subject interpret and analyze the news in fields such as medicine, politics, science, education, business, labor and religion.

Reporters on small newspapers may not only cover all aspects of local news, but also may take photographs, write headlines, lay out pages, and write editorials. On some small weeklies, they also may solicit advertisements, sell subscriptions, and perform general office work.

Places of Employment

About 39,000 persons, two-fifths of them women, worked as newspaper reporters in 1972. The ma-

jority of reporters work for daily newspapers; others work for weekly papers, press services, or for a group of newspapers called a syndicate.

Reporters work in cities and towns of all sizes. Of the 1,750 daily and 7,-600 weekly newspapers, the great majority are in medium-sized towns. However, most reporters work in cities, since big city dailies employ many reporters, whereas a small-town paper generally employs only a few.

Training, Other Qualifications, and Advancement

Most newspapers will consider only applicants who have a college education. Graduate work is increasingly important. Many editors prefer graduates who have a degree in journalism, which usually provides a liberal arts education along with professional journalism training. Some editors consider a liberal arts degree sufficient. Other editors prefer applicants who have a liberal arts bachelor's degree and a Master's degree in journalism. Although talented writers having little or no academic training beyond high school sometimes become reporters on city newspapers, most reporters without college training begin on rural, small-town, or suburban papers.

Bachelor's degree programs in journalism are available in over 200 colleges; about two-thirds of these schools have separate departments or schools of journalism. About three-fourths of the courses in a typical undergraduate journalism curriculum are in liberal arts. Journalism courses include reporting, copyreading, editing, feature writing, and the history of journalism.

More than 250 junior colleges offer journalism programs. Credit secured in most is transferable to a 4-year college program in journalism.

Some junior colleges also offer programs especially designed to prepare the student directly for employment as a general assignment reporter on a weekly or small daily newspaper. The Armed Forces also provide some training in journalism.

A graduate degree in journalism was offered by 78 schools in 1972. Many of them offer a doctor's degree in mass communications.

Young people who wish to prepare for newspaper work through a liberal arts curriculum should take English courses that include writing, as well as subjects such as sociology, political science, economics, history, psychology, and speech. Ability to read and speak a foreign language and some familiarity with mathematics also are desirable. Those who look forward to becoming technical writers or reporters in a specialized field such as science, should concentrate on course work in their subject-matter areas. (See statement on Technical Writers). Skill in typing generally is desirable since reporters usually must type their own news stories. On small papers, knowledge of news photography also is valuable.

The Newspaper Fund and individual newspapers offer summer internships that provide college students with an opportunity to practice the rudiments of reporting or editing. In addition, more than 2,150 journalism scholarships, fellowships, assistantships, and loans were awarded to college journalism students by universities, newspapers, and professional organizations in 1972.

News reporting involves a great deal of responsibility, since what a reporter writes frequently influences the opinion of the reading public. Reporters should be dedicated to serving the public's need for accurate and impartial news. Although reporters work as part of a team, they have an opportunity for self-expression. Important personal char-

acteristics include a "nose for news," curiosity, persistence, initiative, resourcefulness, an accurate memory, and the physical stamina necessary for an active and often fast-pace life.

Some who compete for full-time reporter jobs find it is helpful to have had experience as a "stringer"—a part-time reporter who covers the news in a particular area of the community for a newspaper and is paid on the basis of the stories printed. Experience on a high school or college newspaper also may be helpful in getting a job.

Many beginners start on weekly or on small daily newspapers where they acquire a broad range of reporting experience. Some college graduates are hired by large city papers as general assignment reporters while others start as copy editors. Beginning reporters usually are assigned duties such as reporting on civic and club meetings, summarizing speeches, writing, obituaries, interviewing important visitors to the community, and covering police court proceedings. As they gain experience, they may report more important events, cover an assigned "beat," or specialize in a particular field.

Newspaper reporters may advance to reporting for larger papers or press services and newspaper syndicates. Some experienced reporters become columnists, correspondents, editorial writers, editors, or top executives; these positions represent the top of the field and competition for them is keen. Other reporters transfer to related fields such as public relations, writing for magazines, or preparing copy for radio and television news programs.

Employment Outlook

Beginners with exceptional writing talent are expected to find favorable

employment opportunities through the mid-1980's. Others, however, will face strong competition for jobs, especially on large city dailies. Employment opportunities for reporters able to handle news about highly specialized or technical subjects are expected to be favorable.

Weekly or daily newspapers located in small towns and suburban areas are expected to continue to offer the most opportunities for beginners entering newspaper reporting. Openings arise on these papers as reporters gain experience and transfer to reporting jobs on larger newspapers or to other types of work. Beginning reporters able to help with photography and other specialized aspects of newspaper work and who are acquainted with the community are likely to be given preference in employment on small papers.

Inexperienced persons with good educational backgrounds and a flair for writing may find some openings as reporter trainees on large city dailies. Some opportunities may continue to be available for young people to enter clerical jobs and advance to reporting. In addition to jobs in newspaper reporting, recent college graduates who have journalism training may enter related fields such as advertising, public relations, trade and technical publishing, and radio and television. Some job opportunities also will be found in teaching journalism.

The broad field of mass communication, which has grown rapidly in recent years, is expected to continue to expand due to rising levels of education and income; increasing expenditures for newspaper, radio, and television advertising; and a growing number of trade, technical journals, and various types of company publications. As newspapers share in this growth, employment of reporters is expected to increase moderately.

Most job openings, however, will continue to arise from the need to replace reporters who are promoted to editorial or administrative positions, transfer to other fields of work, retire, or leave the profession for other reasons.

Earnings and Working Conditions

Reporters working for daily newspapers having contracts negotiated by The Newspaper Guild averaged starting salaries of \$7,600 in late 1972. Starting annual salaries ranged from less than \$5,200 at the large metropolitan dailies. In general, earnings of newspaper reporters in 1972 were above average earnings received by nonsupervisory workers in private industry, except farming.

Minimum salaries of reporters having 4 or 5 years experience who worked for daily newspapers with Guild contracts averaged \$12,300 in 1972. The minimums ranged from \$8,800, paid by the smallest dailies, to more than \$15,600 paid by the largest. Many reporters were paid salaries higher than these minimums, however. Reporters working for national wire services received annual salaries of at least \$14,000.

Most newspaper reporters generally work a 5-day, 35 or 40 hour week. Reporters working for morning papers usually start work in the late afternoon and finish at about midnight. Most reporters also receive benefits such as paid vacations, group insurance, and pension plans.

Sources of Additional Information

Information about opportunities for reporters with daily newspapers is available from:

American Newspaper Publishers' Association, P.O. Box 17407, Dulles International Airport, Washington, D.C. 20041.

Information on opportunities in the newspaper field and starting salaries of journalism graduates, as well as a list of journalism scholarships, fellowships, assistantships, and loans available at colleges and universities is available from:

The Newspaper Fund, Inc., Box 300,
Princeton, N.J. 08540.

Information on union wage rates is available from:

The Newspaper Guild, Research
Department, 1125 15th St. NW.,
Washington, D.C. 20005.

For general information about jobs in journalism contact:

American Council on Education for
Journalism, School of Journalism,
University of Missouri, Columbia,
Mo. 65201.

Association of Education in Jour-
nalism, 5172 Vilas Community
Hall, University of Wisconsin,
Madison, Wisc. 53706.

Sigma Delta Chi, 35 East Wacker Dr.,
Chicago, Ill. 60601.

Information on the opportunities for women in newspaper reporting and other communications fields is available from:

Women In Communications, Inc.,
8305 A Shoal Creek Blvd., Austin,
Tex. 78758.

Names and locations of daily newspapers and a list of schools and departments of journalism are published in the *Editor and Publisher International Yearbook*, available in public libraries and in most large newspaper offices.

RADIO AND TELEVISION ANNOUNCERS

(D.O.T. 159.148)

Nature of the Work

Most radio announcers act as disc jockeys, introducing recorded music, presenting news and commercials, and commenting on other matters of interest to the audience. They "ad-lib" much of the commentary, working without a detailed script. They also may operate the control board, sell time for commercials, and write commercial and news copy. In large stations, however, other workers handle these jobs. (See statement on the radio and television broadcasting industry elsewhere in the *Handbook*.)

Announcers employed by television stations and large radio stations usually specialize in particular kinds of programs such as sports, news, or weather. They must be thoroughly familiar with their areas of specialization. If a written script is needed for parts of the program, the announcer may do the research and writing. Announcers frequently participate in community activities. A sportscaster, for example, might be the master of ceremonies at a touch-down club banquet or greet customers at the opening of a new sporting goods store. Some announcers become well-known and highly-paid personalities.

Places of Employment

About 17,000 staff announcers were employed full-time by commercial radio and television broadcasting stations in 1972. More than 80 percent of them worked in radio broadcasting. The average commercial radio or television station employed 2 announcers, although larger stations sometimes employed 4 or more. In addition to staff announc-

ers, several thousand freelance announcers sell their services for individual assignment to networks and stations, or to advertising agencies and other independent producers.

Training, Other Qualifications, and Advancement

Announcers must have a pleasant and well-controlled voice, a good sense of timing, and excellent pronunciation. Correct English usage and a knowledge of dramatics, sports, music, and current events improve chances for success. The most successful announcers have a combination of personality and showmanship that makes them attractive to audiences.

High school courses in English, public speaking, dramatics, and foreign languages, plus sports and music hobbies, are valuable background for prospective announcers. A number of vocational schools offer training in announcing, and many universities offer courses of study in the broadcasting field. A college liberal arts education also provides an excellent background for an announcer.

Most announcers get their first broadcasting jobs in small stations. Because announcers in small stations sometimes operate transmitters, prospective announcers often obtain an FCC Radiotelephone First Class Operator License which enables them to operate a transmitter and, therefore, makes them much more useful to these stations. Announcers more frequently operate control boards, for which only a Third Class License is required. (For information on how to obtain such licenses, see the statement on broadcast technicians elsewhere in the *Handbook*.)

Announcers usually work in several different stations in the course of their careers. After acquiring experience at a station in a small com-



munity, an ambitious and talented announcer may move to a better-paying job in a large city. An announcer also may advance by getting a regular program as a disc jockey, sportscaster, or other specialist. In the national networks, competition for jobs is intense, and announcers usually must be college graduates and have several years of successful announcing experience before they are given an audition.

Employment Outlook

The employment of announcers is expected to increase moderately through the mid-1980's as new radio and television stations are licensed. Employment growth, however, will be limited by the increased use of automatic programming. Most job openings in this relatively small occupation will result from the need to replace experienced announcers who

transfer to other occupations, retire, or die.

It will be easier to get an entry job in radio than in television because of the greater number of radio stations, especially small stations, that hire beginners. However, the great attraction of this field for young persons, and its relatively small size will result in keen competition for entry jobs.

Earnings and Working Conditions

Salaries of beginning announcers in commercial television ranged from about \$140 to \$200 a week in 1972, and those of experienced announcers ranged from about \$175 to \$260, according to information from a small number of union contracts. Some well-known announcers earn much more. As a rule, salaries increase with the size of the com-

munity and the station, and salaries in television are higher than those in radio. Announcers employed by educational broadcasting stations generally earn less than those who work for commercial stations.

Most announcers in large stations work a 40-hour week and receive overtime pay for work beyond 40 hours. In small stations, many announcers work 2 to 8 hours of overtime each week. Working hours consist of both time on the air and time spent in preparing for broadcasts. Evening, night, weekend, and holiday duty occurs frequently since many stations broadcast 24 hours a day, 7 days a week.

Most announcers receive paid vacations. Typically, vacations range from 1 to 4 weeks, based on length of service.

Working conditions are usually pleasant because of the variety of work and the many personal contacts that are part of the job. Announcers also receive some satisfaction from becoming well known in the area their station serves.

Sources of Additional Information

General career information may be obtained from:

National Association of Broadcasters,
1771 N St. NW., Washington, D.C.
20036.

Corporation for Public Broadcasting,
888 16th St. NW., Washington,
D.C. 20006.

TECHNICAL WRITERS

(D.O.T. 139.288)

Nature of the Work

The many technical and scientific developments and new consumer products of recent years have created a need for skilled writers to interpret these developments and write instructions for their use. Technical writers organize, write, and edit materials about science and technology in order to establish clearer communication between scientists, engineers, and other technical specialists, and the users of their information—technicians, repairmen, scientists, engineers, executives, or housewives. Their writing must always be clear and easy to follow, and when it is to be used by specialists it often must include technical detail and a highly specialized vocabulary. Technical writers usually arrange for the preparation of tables, charts, illustrations, and other artwork, and may work with technical illustrators, draftsmen, or photographers.

Before starting a writing assignment, technical writers usually learn as much as they can about their subject. This process involves studying reports, reading technical journals, and consulting with the engineers, scientists, and other technical personnel who have worked on the project. Then they prepare a rough draft that may be revised several times before it is accepted in final form.

The technical writer's product takes many forms, such as publicity releases on a company's scientific or technical achievements, or on manufacturers' contract proposals to the Federal Government. It may be manuals that explain how to operate, assemble, disassemble, maintain, or overhaul components of a missile system or a home appliance.

Technical writers may also write for scientific and engineering periodicals and for popular magazines.

Places of Employment

An estimated 20,000 technical writers and editors were employed in 1972. Most technical writers are employed in the electronic and aerospace industries. Many work for research and development firms or for the Federal Government—mainly in the Departments of Defense and Agriculture, the Atomic Energy Commission, and the National Aeronautics and Space Administration. Some work in firms that specialize in technical writing. Others are in business for themselves as freelance technical writers.

Technical writers are employed all over the country, but primarily in the Northeastern States, Texas, and California. They are concentrated in the Washington, D.C., Los Angeles-Long Beach, Houston, Fort Worth-Dallas, Chicago, New York, Boston, St. Louis, Kansas City, Denver, and Philadelphia metropolitan areas.

Training, Other Qualifications, and Advancement

A bachelor's degree is generally required in order to begin work in this field, although talented and experienced writers who have less academic training may qualify.

Some employers prefer applicants with degrees in engineering or science who have had courses in writing. Others seek graduates who majored in English or journalism, and who have taken some courses in science and technical subjects. Regardless of which major they prefer, all employers require a knowledge of science and technology and place great emphasis on writing skills.

In 1972, 10 colleges and univer-

sities offered 4-year programs leading to a bachelor's degree in technical writing, technical communication, or technical journalism; three schools offered graduate work and degrees in the field. In addition, many schools provide professional education leading to a bachelor's degree in journalism; most of these offer at least one course in technical writing as part of the regular curriculum. Almost all colleges, and some engineering schools, offer English courses to sharpen writing skills. Some conduct summer workshops and short-term seminars for technical writers. Young people who plan to enter this field can gain valuable experience while still in school by working as editors or writers for their high school or college newspapers.

Besides having writing skills, technical writers should think logically and like to do detailed and accurate work. They should be able to work and talk with others, since they often work as part of a team. At other times, however, technical writers must work alone with little or no supervision, so they should be able to accept responsibility. Technical writers also should like working with ideas and seeing the results of their work.

Beginners often assist experienced technical writers by doing library research, and by editing and preparing drafts of reports. Experienced writers in organizations that have large technical writing staffs may advance to positions of technical editors or other supervisory and administrative positions. After gaining experience and contacts, a few may go into business for themselves. It also is possible to advance by becoming a specialist in a particular scientific or technical subject. These writers sometimes prepare syndicated newspaper columns or articles for popular magazines.



Technical writers often work as part of a team.

Employment Outlook

Employment of technical writers is expected to increase moderately through the mid-1980's. Additional opportunities will result from the need to replace those who die, retire, or transfer to other occupations. Experienced technical writers and beginners who have good writing ability and the appropriate education should find opportunities for employment. Those with only minimum qualifications, however, may face stiff competition for beginning jobs.

Requirements for technical writers are expected to increase because of the need to put the growing amount of scientific and technical information into language that can be understood by managers for decision-making and by technicians for operating and maintaining complex industrial equipment. Since many products will continue to be assembled from components manufactured by different companies, technical writers also will be needed to describe, in simple terms, how the components fit together. Others will be needed to improve and simplify

operating and maintenance instructions for consumer products.

However, since many technical writers work in defense- and space-related activities, including research and development, future job opportunities are related to government expenditures in these areas. Through the mid-1980's, R&D expenditures of Government and industry are expected to increase, although at a slower rate than during the 1960's, reflecting the reduced importance of the space and defense components of R&D expenditures.

Technical writers, as discussed in this statement, include only those persons whose primary job is to write about, interpret, and edit technical subject matter. Those primarily employed as scientists, engineers or other technical specialists who may do a considerable amount of writing are not covered here. As technology becomes increasingly complex, more writing assignments may require technical and scientific knowledge equivalent to that of an engineer or scientist.

Technical writers who have training in journalism may find opportunities in other fields that employ writers such as advertising, public relations, trade publishing, and television and radio broadcasting.

Earnings and Working Conditions

Technical writers had high earnings in 1972, compared with average earnings for nonsupervisory workers in private industry, except farming. Inexperienced technical writers having bachelor's degrees received starting salaries ranging from \$6,000 to \$8,500 a year; those with moderate experience earned from \$8,500 to \$12,000 a year; highly experienced writers earned from \$12,000 to \$16,000; and those in supervision and

management, \$20,000 or more. Salaries of technical writers depend not only on ability and previous experience, but also on the type, size, and location of their employing firm. Earnings of freelance writers vary greatly and depend on the writer's ability and reputation.

In the Federal Government in early 1973, inexperienced technical writers with a bachelor's degree and

about five science courses could start at either \$7,694 or \$9,520 a year, depending on their college grades. Those with two years of experience could start at \$11,614 and with three years of experience, \$13,996.

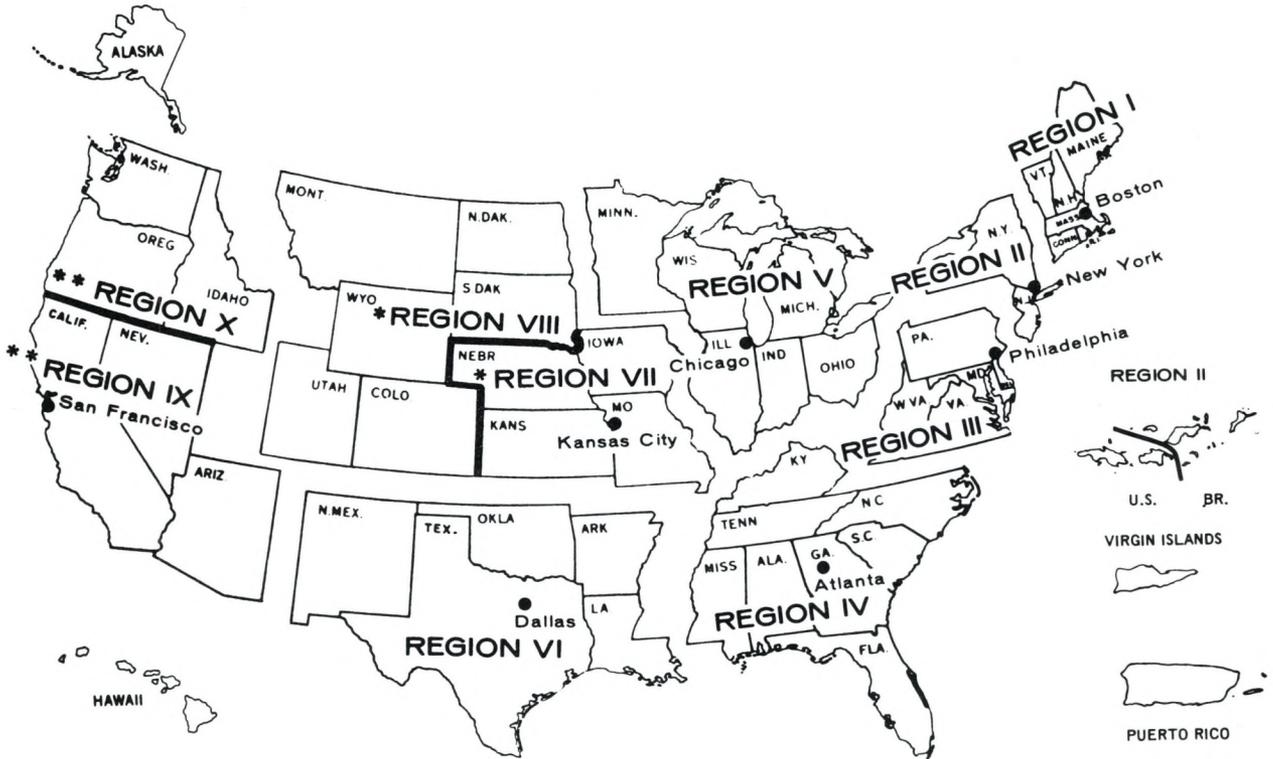
Technical writers may work under considerable pressure, frequently working overtime when a deadline has to be met on a publication or report.

Sources of Additional Information

For information about careers in technical writing, contact:

Society for Technical Communications, Inc., Suite 421, 1010 Vermont Ave. NW., Washington, D.C. 20005.

**BUREAU OF LABOR STATISTICS
REGIONAL OFFICES**



Region I
1603 JFK Federal Building
Government Center
Boston, Mass. 02203
Phone: 223-6762 (Area Code 617)

Region II
1515 Broadway
New York, N.Y. 10036
Phone: 971-5405 (Area Code 212)

Region III
P. O. Box 13309
Philadelphia, Pa. 19101
Phone: 597-1154 (Area Code 215)

Region IV
Suite 540
1371 Peachtree St., NE.
Atlanta, Ga. 30309
Phone: 526-5418 (Area Code 404)

Region V
8th Floor, 300 South Wacker Drive
Chicago, Ill. 60606
Phone: 353-1880 (Area Code 312)

Region VI
1100 Commerce St., Rm. 6B7
Dallas, Tex. 75202
Phone: 749-3516 (Area Code 214)

Regions VII and VIII *
Federal Office Building
911 Walnut St., 15th Floor
Kansas City, Mo. 64106
Phone: 374-2481 (Area Code 816)

Regions IX and X **
450 Golden Gate Ave.
Box 36017
San Francisco, Calif. 94102
Phone: 556-4678 (Area Code 415)

* Regions VII and VIII are serviced by Kansas City.
** Regions IX and X are serviced by San Francisco.

U.S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON, D. C. 20212

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