Occupational Outlook Handbook

1984-85 Edition

U.S. Department of Labor
Raymond J. Donovan, Secretary

Bureau of Labor Statistics
Janet L. Norwood, Commissioner

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Foreword

Raymond J. Donovan
Secretary of Labor

The selection of an occupation is one of the most important decisions in a person's life. For the young jobseeker, questions abound as to what skills are required in each field, and how those skills may be attained or refined. Furthermore, while jobseekers may be aware of their own interests and abilities, they face the perplexing choice of selecting a field which promises the greatest economic and personal satisfaction.

As technological advances rapidly alter the job market, it is not only the young who need current, accurate, and comprehensive career information. The choices are no easier for persons seeking a career change, or for those entering the labor force at later stages in their lives. The availability of career information is vital to all jobseekers, and to our Nation as a whole.

The *Occupational Outlook Handbook* is an invaluable primary source of vocational guidance information. In clear language, it describes what workers do in each job, the training and education they need, earnings, working conditions, and expected job prospects for selected occupations covering a wide spectrum of the economy. I am certain that the updated 1984–85 edition of the *Occupational Outlook Handbook* will provide valuable assistance to everyone seeking satisfying and productive employment.

Prefatory Note

Janet L. Norwood
Commissioner,
Bureau of Labor Statistics

Information on tomorrow's career opportunities must be available for today's youth and others if they are to prepare realistically for their future in the world of work. Since the late 1940's, the Bureau of Labor Statistics has conducted research on employment in occupations for use in vocational guidance. A major product of this research is the *Occupational Outlook Handbook*.

The *Handbook* presents current and comprehensive information on work today and job prospects for tomorrow. Revised every two years, this 16th edition of the *Handbook* covers about 200 occupations. For each of these occupations, the *Handbook* discusses job duties, working conditions, level and places of employment, education and training requirements, advancement possibilities, job outlook, earnings, other occupations that require similar aptitudes, interests, or training, and sources of additional information. *Handbook* information is based on data from a variety of sources, including business firms, trade associations, labor unions, professional societies, research organizations, educational institutions, and government agencies.

For some occupations, this edition of the *Handbook* includes recently developed information on movements between occupations and into and out of the labor force. The *Handbook* also includes information about the effect of the business cycle, defense spending, energy development, and other economic variables on occupational employment, and cites occupations whose employment declined during the 1981–82 recession. This edition of the *Handbook* also presents information on selected occupations which are not discussed in detailed occupational statements.

Occupations are grouped according to the *Standard Occupational Classification Manual*, 1980 edition. The *Handbook* also contains an index referenced to the most recent edition and supplement of the *Dictionary of Occupational Titles*.

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Note

A great many trade associations, professional societies, unions, industrial organizations, and government agencies are able to provide career information that is valuable to counselors and jobseekers. For the convenience of *Handbook* users, some of these organizations are listed at the end of each occupational statement. Although these references were assembled carefully, the Bureau of Labor Statistics has neither authority nor facilities for investigating the organizations listed. Also, because the Bureau does not see all the information or publications that may be sent in response to a request, it cannot guarantee the accuracy of such information. The listing of an organization, therefore, does not constitute in any way an endorsement or recommendation by the Bureau or the U.S. Department of Labor, either of the organization and its activities or of the information it may supply. Each organization has sole responsibility for whatever information it may issue.

The occupational information contained in the *Handbook* presents a general, composite description of jobs and cannot be expected to reflect work situations in specific establishments or localities. The *Handbook*, therefore, is not intended and should not be used as a guide for determining wages, hours, the right of a particular union to represent workers, appropriate bargaining units, or formal job evaluation systems.

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Comments about the contents of this publication and suggestions for improving it are welcome. Please address them to Chief, Division of Occupational Outlook, Bureau of Labor Statistics, U.S. Department of Labor, Washington, D.C. 20212.

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How to Get the Most From the Handbook

How much training does it take to enter a particular occupation? Is experience important? How much can I expect to earn? Is it difficult to find a job in this field? Whether you are preparing to enter the world of work for the first time, reentering the labor force after an absence, or planning to retrain for an occupation with a more promising future, such questions arise. Finding the answers can be difficult. However, more resources are available than ever before to help you make an informed career choice.

Among these resources is the *Occupational Outlook Handbook*. Approximately 200 occupations are described in the *Handbook,* although the total number of occupations in the U.S. economy may be counted in the thousands. Occupations requiring long periods of education or training are most likely to appear in the *Handbook,* as are small but rapidly growing fields of employment.

For each of about 200 occupations, the *Handbook* contains a two- to three-page statement that tells what the work is like and discusses education and training requirements, advancement possibilities, earnings, and the job outlook. Altogether, these occupations accounted for well over half of all jobs in the United States in 1982. *Handbook* statements describe the work of approximately 80 percent of the Nation's professional, technical, and sales workers; 70 percent of craft workers; 65 percent of service workers; 55 percent of clerical workers; 50 percent of operatives; and smaller proportions of managerial workers and laborers.

Summary data for an additional 170 occupations are presented in tables that can be found at the end of most chapters. For each occupation listed, you will find a definition; the number of jobs in 1982; and a phrase describing future employment growth or decline. Altogether, these occupations accounted for an additional 20 percent of the Nation's jobs in 1982.

The *Handbook* is not meant to be read from beginning to end. Start by browsing through the table of contents at the front of the book or the alphabetical index at the back. Look for occupations that interest you, or for those that sound familiar. Occupations are grouped in clusters of related occupations, such as "engineers, surveyors, and architects" or "writers, artists, and entertainers."

For an overview, read the introductory chapter on Tomorrow's Jobs. It discusses some of the broad trends that are likely to shape the economy and the world of work over the coming decade.

The First Step: Examining Yourself

Important as it is to learn about the world of work, the first step in making a sound career choice is finding out about yourself. An understanding of your values, feelings, and goals will help you determine what you're looking for in a career. For when you make a career choice, you're directly or indirectly making decisions about the types of people you will associate with, the amount of leisure time you will have, the amount of risk you are comfortable with, and the importance of money in your life. These decisions depend on values you already hold.

About Those Numbers at the Head of Each Statement

The numbers in parentheses that appear just below the title of most occupational statements are *D.O.T.* code numbers. D.O.T. stands for the *Dictionary of Occupational Titles* (fourth edition), a U.S. Department of Labor publication. Each number helps classify jobs by the type of work done, required training, physical demands, and working conditions. D.O.T. numbers are used by Job Service offices to classify applicants and job openings, and for reporting and other operating purposes. They are included in the *Handbook* because career information centers and libraries frequently use them for filing occupational information. An index listing *Handbook* occupations by D.O.T. number may be found just before the alphabetical index in the back of this book.

One way of clarifying your work values centers around identifying the satisfactions you hope to get from your job. Do you, for example, consider it important to help other people, or to contribute to the welfare of society as a whole? The health professions, social work, teaching, urban planning, and public administration are among a number of career fields that offer the opportunity to be of service to others.

Counselors and other professionals trained in human behavior can help you gain insight into your values and goals. They may administer diagnostic tests, for example, and then discuss the results with you. Furthermore, publications on career decisionmaking abound, and these generally explain how you can assess your values and skills on your own.

Woven throughout every statement in the *Handbook* is information that can help you match yourself to the world of work. The following list of job characteristics should be kept in mind since you will find them mentioned in several different sections of a typical *Handbook* statement. Remember that the importance of attributes such as those listed below varies from job to job, as well as from person to person.

—*Problem-solving ability*—requires the ability to identify a problem and then decide what should be done to correct it. Auto mechanics, who spend much of their time fixing cars, need problem-solving ability.

—*Uses tools, machinery*—takes a talent for working with your hands. Often, knowing how machines work is necessary, too. Toolmakers, who use machine tools and precision measuring instruments to produce other tools and metal forms, need skill in this area.

—*Instructs others*—needs the ability to help others learn how to do or understand something. Receptionists and hotel clerks help others in this way.

—*Repetitious*—involves work in which the same thing is done over and over again. An assembler who works on a production line does repetitious work.

—*Hazardous*—involves the use of dangerous equipment or materials or work in dangerous surroundings. Elevator constructors, who work at great heights, have hazardous jobs.

—*Outdoors*—requires a major portion of time to be spent outdoors, frequently without regard to weather conditions. Roofers, who applying roofing materials to the tops of buildings, work outdoors.

—*Physical stamina*—involves the ability to lift heavy weights, walk long distances, stand for long periods, or stoop frequently. Bricklayers, police officers, and chefs all need physical stamina.

—*Generally confined*—involves staying in one place most of the time. Truckdrivers who sit behind the wheel for many hours and statistical clerks who do their work at a desk for most of the day are examples.

—*Precision*—involves high standards of accuracy. Accountants, air traffic controllers, and machinists are examples.

—*Works with detail*—involves technical data, numbers, or written materials. Machinists who consult blueprints or written specifications before making each machined product and programmers who write instructions for the computer are examples.

—*Frequent public contact*—involves day-to-day contact with people who need information or service. Automobile service advisers, receptionists, hotel clerks, bank tellers, waiters, and barbers are all examples.

—*Part time*—refers to work of less than 35 hours a week. Waiters and waitresses and real estate agents are examples.

—*Able to see results*—refers to jobs that produce an actual product or accomplishment. Bricklayers, chefs, and choreographers all see results.

—*Creativity*—involves new ideas, programs, designs, or products. Writers, industrial designers, and engineers are examples of the many different kinds of workers whose jobs require creativity.

—*Influences others*—requires the ability to stimulate others to think or act in a certain way. Automobile sales workers who influence customers to buy and teachers who inspire students to learn are examples.

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—*Initiative*—demands the ability to determine on one's own what should be done, as well as the motivation to do it without close supervision. Lawyers and newspaper reporters need initiative.

—*Works as part of a team*—cooperation with coworkers is an integral part of the job. Instrument makers, who work closely with scientists and engineers to translate designs into models, and school counselors, who work closely with other staff members, are examples.

—*Competition on the job*—competition with coworkers for recognition or advancement is an integral part of the job. College teachers who compete for tenure, securities sales workers who compete for commissions, and models who compete for assignments are all examples.

Identifying your interests and abilities provides another way of matching yourself to the world of work. Do science or math interest you? Do you like to read? Do you enjoy working with your hands and building things? The answers to such questions can help you discover your strengths, and may suggest careers it would be worthwhile to explore.

Suppose you have a flair for language and want to put your talent to work in the field of writing and publishing. You might look for a job as a:

—Journalist

—Script writer

—Advertising worker

—Technical writer

—Greeting card writer

—Crossword puzzle writer

—Public relations worker

—Textbook editor

—Manuscript reader

—Index editor

—Literary agent

—Bookstore manager

—Publisher's representative

—Book club sales associate

—Magazine circulation assistant

New specialties in writing have developed as a result of increasing specialization in our modern world. Science writing, business writing, and medical writing all present possible options to those with skills in writing.

Writing and publishing jobs aren't the only ones that require an excellent command of language, however. Communication skills are vital to many occupations, and the more skills people have in English and language arts, the more valuable they will be in the working world.

For example, lawyers must have topnotch communication skills to be successful in digesting and analyzing large amounts of information and presenting their cases before others. Lobbyists and fundraisers, too, must be effective communicators, as well as those who hold political office or are in social service occupations. Librarians and teachers also need good communication skills.

To locate *Handbook* statements on occupations that require language skills, start with the section on Communication Occupations, but remember that that is only the beginning! Skim the table of contents, or read the introductory material at the beginning of each cluster, to determine which other statements are worth investigating.

Don't limit yourself by examining only a few occupations. You'll want to begin with those that interest you most, of course, but don't rule out others too soon. Some jobs may not appeal to you simply because you're not familiar with them. They might be worth looking into. Remember, also, that you haven't wasted your time if you investigate a career only to decide that it's not right for you. Finding out what you don't like is important, too.

Career exploration isn't something you do just once. Taking stock of your interests is something you're apt to do from time to time throughout your life. You will continue to change as the years go by, and it is likely that your career interests and goals will change as well.

The Next Step: Examining the World of Work

Once you have chosen an occupation you'd like to learn more about, you can use the *Handbook* to find out what the job is like, what education and training are needed, what the advancement possibilities, earnings, and job outlook are likely to be, and what related occupations you might want to explore. Each statement in the *Handbook* follows a standard format, making it easier to compare different jobs. What follows is a description of the major sections of a *Handbook* statement, plus some hints on how to use the information.

Nature of the work. This section tells what workers typically do on the job, what tools or equipment they use, how closely they are supervised, and how their responsibilities fit in with those of others in the same workplace. In practice, job duties vary a good deal, depending on the size or type of employer. In general, people in small organizations handle a wider variety of tasks than those in large offices or firms, where workers are likely to specialize in one or more aspects of the job.

Working conditions. When considering an occupation, you may want to find out whether the working conditions suit you. Some aspects of the work may strike you as difficult, dirty, or otherwise undesirable. Other aspects may appeal to you. Most jobs offer a little of both. For example, when overtime is required, employees must give up some of their free time and be flexible in their personal lives. This is offset, however, by the opportunity to earn extra income or time off.

Evening or nightwork is part of the regular work schedule in many jobs. Bartenders, guards, broadcast journalists and technicians, and some factory workers may be required to work these shifts on a permanent basis. Workers in other occupations, such as nurses and police officers, may work nights on a rotating basis. Still other workers may be assigned to split shifts: Busdrivers, for example, may work morning and evening rush hours with time off in the middle of the day. However, some people prefer shiftwork because they can pursue leisure activities or take care of errands during daytime hours.

Work settings vary greatly. They include office buildings, construction sites, mines, factories, restaurants, stores, ships and planes. Some people like a quiet, air-conditioned setting; others prefer the hum of machinery. By knowing the setting of jobs you find interesting, you can avoid working in an environment that you would find unpleasant.

Many workers have to be outdoors some or all of the time. Mail carriers, construction workers, firefighters, and foresters are a few examples. Being exposed to all types of weather may be preferred to indoor work, however, by those who enjoy the outdoors.

Some jobs are potentially dangerous. Cuts, burns, and falls can occur in restaurant kitchens, factory assembly lines, and forge shops, for example. Consequently, many jobs, such as those involving the use of nuclear materials or radiologic equipment, require the use of specially designed equipment and protective clothing.

Some jobs require standing, crouching in awkward positions, heavy lifting, or are otherwise strenuous. Be sure you have sufficient physical strength and stamina for the work you are interested in.

Employment. This section tells how many jobs there were in the occupation in 1982. The size of an occupation has a lot to do with job prospects because the larger the occupation, the greater the number of openings when workers transfer to other occupations or leave the labor force. In exceptionally large occupations—a category that includes secretaries, typists, bookkeepers, cashiers, registered nurses, nursing aides, janitors, and truckdrivers—employment size is the single most important determinant of the very large number of jobs anticipated through the mid-1990's.

This section also tells whether an occupation is concentrated in certain industries or geographic areas. Some jobs, such as secretaries, are found throughout the country and in almost every industry. Others, like actors and actresses, are concentrated in certain parts of the country. This type of information helps you know where to go to look for the kind of job you want. It also is useful to those who have strong preferences about where they live.

In addition, information on part-time employment may be included. For students, homemakers, retired persons, and others who may want to work part time, knowing which occupations offer good opportunities for part-time work can be a valuable lead in finding a job.

Training, other qualifications, and advancement. This section should be read carefully because preparing for an occupation can mean a considerable investment of time and money. If you currently are in school, it's a good idea to look closely at the high school and college courses considered useful preparation for the career you have in mind.

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Workers can prepare for jobs in a variety of ways, including college programs leading to a degree, certificate, or diploma; postsecondary vocational school programs, both public and private; home study courses; government training programs; Armed Forces training; apprenticeships and other formal training offered by employers; and high school courses. For each occupation, the *Handbook* identifies the preferred training. In many cases, alternative ways of obtaining training are listed as well. Remember, the amount of training you have often determines the level at which you enter an occupation and the speed with which you advance.

Today, few people spend their entire adult lives in a single occupation. Roughly 1 worker in 9 changes his or her occupation each year. And most people enter, leave, and reenter the labor force several times over a lifetime.

If a pattern of movement exists from one occupation to another, it usually is discussed in this part as a *Handbook* statement. It is helpful to know that certain jobs are steppingstones to others. Typist, messenger, dining room attendant, dishwasher, freight handler, and construction laborer are examples of entry-level jobs that are open to people with little or no work experience. Skills and work habits gained at jobs such as these can lead to more responsible, higher paying jobs.

Conversely, some occupations are not open to beginners. Management jobs such as bank officer, restaurant manager, or regional sales manager, for example, generally require previous experience.

The health field offers numerous examples of career mobility, in part because there are so many different occupations in this large and dynamic industry. Further, health care has become so sophisticated and complex that workers who already are part of the system enjoy certain advantages over those who have no background in health care. It is not uncommon, for example, for a registered nurse, medical laboratory technologist, or radiographer to undertake the additional training needed to prepare for a more highly skilled job as a physician assistant, nurse practitioner, or radiation therapy technologist. Opportunities to train for these occupations are limited, by and large, to people who already have a health professions background.

For some occupations, certification or licensure is required. Physicians and nurses, elementary and secondary school teachers, barbers and cosmetologists, and electricians and plumbers are examples of workers who must be licensed. This section identifies occupations that require licensure and what the general requirements are. However, States vary in their licensing requirements. If you are considering an occupation that requires a license, be sure to check with the appropriate State agency about specific requirements. Common requirements include completion of a State-approved training or educational program and passing a written examination.

Because of licensure and certification requirements, movement from one clinical health career to another generally requires an additional set of credentials. For example, despite what might be years of experience in a dentist's office, a dental assistant cannot advance to a job as a dental hygienist without completing a formal program in dental hygiene. This section alerts readers interested in the prospects for advancement in an occupation to potential barriers posed by legal restrictions or standard hiring practices.

In many other occupations, however, there are no such barriers. People with related education or experience enter without obtaining a license or additional formal education. This is the case in engineering, for example, where some graduates in physics, chemistry, computer science, mathematics, and other fields are hired as engineers directly from college. Others without engineering degrees transfer into engineering from related scientific fields and technician occupations.

Job outlook. What's the job market like? This is the question uppermost in many people's minds as they try to determine whether a particular career is worth pursuing. What constitutes a "good" or "attractive" job varies with the individual and depends on personal values. But because of the cost—and often the sacrifice—involved in preparing for a career, the likelihood of finding a suitable job is something virtually everyone is interested in.

This, in turn, depends on the relationship between the number of openings and the number of people seeking to fill those openings. Jobs for dishwashers, for example, require physical stamina and dependability, but little in the way of formal education or vocational skills. Since so many people fit the description, the supply of potential dishwashers is enormous. By contrast, a job as a nuclear engineer requires scientific and technical expertise that is gained through years of formal training; the number of people with the appropriate background is quite small. Most jobs fall somewhere in between.

Bear in mind that in any particular occupation, demand for workers varies according to skill level, specialty, educational background and professional credentials, previous experience, and so forth. Moreover, the supply of qualified jobseekers varies as well. That is why there can be shortages in some communities or in some specialties while qualified applicants are a dime a dozen in others.

Mid-level personnel may be in great demand, for example, while there are too few jobs for beginners. Such is the case in law. Law schools have difficulty attracting and retaining established practitioners as faculty. Established lawyers can make more money practicing law than teaching it. The oversupply of newly trained lawyers, however, creates keen competition for starting jobs except for the graduates of top law schools.

Whether or not the job outlook is favorable is partly a matter of suitable openings in the community or kind of firm where you're seeking work. But the amount of competition from others who are equally well qualified is the key factor. And the amount of competition from other jobseekers can change almost overnight. During the recent recession, for example, the nursing "shortage" vanished, reflecting a drop in demand combined with an unanticipated surge in supply. Many hospitals reported a sudden reversal in supply-demand conditions, with unfilled vacancies giving way to waiting lists for jobs.

The *Handbook* describes job outlook primarily in terms of long-term employment growth. Most statements begin with a sentence about expected change through the mid-1990's. The number of jobs for typists, for example, is expected to grow more slowly than the average for all occupations, while the number of jobs for physical therapists is expected to grow much faster than the average for all occupations. The accompanying figure explains what is meant by these and other key phrases.

Key Words in the *Handbook*

Changing employment between 1982 and 1995

If the statement reads . . .	Employment is projected to . . .
Much faster than average growth	Increase 50 percent or more
Faster than average growth	Increase 30 to 49 percent
Growth about as fast as average	Increase 20 to 29 percent
Growing more slowly than average	Increase 6 to 9 percent
Little change	Increase or decrease 5 percent
Decline	Decrease 6 percent or more

Opportunities and competition for jobs

If the statement reads . . .	The demand for workers may be . . .
Excellent opportunities	Much greater than the supply
Very good opportunities	Greater than the supply
Good or favorable opportunities	About the same as the supply
May face competition	Less than the supply
Keen competition	Much less than the supply

Projected change is probably a more useful guide to outlook when an occupation is growing rapidly than when it is growing slowly. If an occupation grows rapidly, it will provide more openings than if it grows slowly. Moreover, the demand for talent in a rapidly growing occupation improves chances for advancement and mobility—as anyone in the computer field can testify. Depending on how long it takes for training programs to respond to the heightened demand, jobseekers' prospects may be enhanced by a shortage of qualified applicants.

What can be said about job prospects when an occupation is projected to grow more slowly than average? There is no single answer to this question because so many different factors are at work. Slower-than-average growth may mean relatively unfavorable prospects—as is

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the case for postal workers and printing craft workers. For one thing, company policies designed to provide job security are likely to reduce opportunities for persons not already employed by the firm. The printing trades, for example, have been revolutionized by the introduction of labor-saving technologies, and many jobs have been lost. In firms that use advanced typesetting computers, jobs vacated by experienced compositors and typesetters generally are not filled. And programs to retrain company employees dislocated by new technologies have the effect of limiting the number of openings for people outside the firm.

At the same time, such slow-growing occupations as typist and bookkeeper rank high on the list of occupations providing the largest number of job openings—a measure of favorable outlook. In both occupations, the negative effect of slower-than-average employment growth is outweighed by the sheer size of the occupation, thanks to replacement openings.

In virtually every occupation, regardless of the rate of growth, the need to replace workers who leave their jobs generates most openings. Replacement rates vary, but it is generally true that the larger the occupation, the more openings there are due to replacements. Thus even slow-growing occupations can rank among those with the most openings.

Research conducted in the Bureau has produced a new method of estimating replacement needs. With increased understanding of patterns of labor force movement, it is clear that replacements are a much more important source of job openings than was previously believed. For a brief explanation, see the chapter entitled Assumptions and Methods Used in Preparing the Employment Projections.

For most occupations, the factors expected to contribute to future demand for workers are identified in the job outlook section of a *Handbook* statement. This is where you will find a discussion of the employment impact of office automation, robotics, shifting population patterns, and so forth.

Some statements discuss job security. The recent recession has made jobseekers painfully aware of the sensitivity of employment to changes in the business cycle, and the *Handbook* gives information on the subject wherever possible. But there are additional factors that make some jobs more secure than others. In the building trades, for example, seasonal patterns and the volatility of demand for new housing make construction workers susceptible to higher than average rates of unemployment in good times as well as bad.

For a few occupations, information is presented on the projected supply of workers—in particular, the number of new graduates or newly qualified practitioners. New graduates are not the only source of supply, however. Every year, a large proportion of job openings are filled by reentrants or by people transferring from other occupations. In occupations where women traditionally have predominated, such as librarian, reentrants play an especially important role in supply. Similarly, people transferring from other occupations constitute a substantial portion of the supply of engineers. When information is available, the *Handbook* describes patterns of occupational entry and exit and explains what they mean for job outlook.

The information in the job outlook section should be used carefully. The prospect of relatively few openings, or of strong competition, in a field that interests you should make you take a second look at your career choice. But this information alone should not prevent you from pursuing a particular career if you are confident about your ability and determined to reach your goal.

Keep in mind that no one can predict future labor market conditions with perfect accuracy. Methods used by economists to develop information on future occupational prospects differ, and judgments that go into any assessment of the future also differ. For every occupation covered in the *Handbook,* an estimate of future employment needs is developed. These estimates are consistent with a set of assumptions about the future. For an explanation of how these projections are developed, see the chapter on assumptions and methods.

Finally, it is possible that prospects in your community or State do not correspond to the description of job outlook in the *Handbook*. For the particular job you are interested in, the outlook in your area may be better—or it may be much worse.

Because local conditions vary so much, it is wise to talk with counselors, employers, Job Service staff, and others about the particular area where you want to work. State and local chapters of labor unions and professional associations may be able to finish useful leads. At the end of the following chapter, you will find a list of State officials who should be able to direct you to people familiar with the job market in a particular city or State. Addresses and telephone numbers are given for the directors of the State Occupational Information Coordinating Committees, and for the directors of research and analysis of the State employment security agencies.

Earnings. Many people turn to the *Handbook* for the answers to such questions as, "How much does the average plumber earn?" or "What are the highest paying jobs?" or, "Who earns more, a secretary or a nurse?"

Unfortunately, no single statistic can adequately portray the tremendous differences in earnings of workers in a particular occupation, and it is very easy to be misled. Users should look upon the earnings data presented in this section of a *Handbook* statement as a clue to an occupation's attractiveness and its potential for long-term reward. But bear in mind that the *Handbook* can't predict what you might earn, nor does it try to. Your earnings will depend on many things, including your experience and ability, the firm and industry you work in, and the section of the country where you live.

It is true that major occupational groups exhibit significant differences in pay. Usual weekly earnings of managers and administators, for example, are about double those of service workers. But there are wide disparities *within* most occupations as well. In fact, earnings within occupations vary so widely that in many cases it is impossible to say which of several jobs would pay best. Engineers earn more than drafters, on average. But the highest paid drafters (those with earnings in the top 10 percent) make more money than *half* of all engineers.

Differences in skill are part of the explanation. Within a particular occupation, average salaries of workers at the top levels may be several times as high as those in entry level jobs. The latter usually require less training, embody simpler job functions, and carry little or no supervisory responsibility.

Geographic variations account for some of the differences in occupational pay. While location is an important factor for nearly all workers, it is especially important for unskilled workers, whose pay levels are strongly affected by local market conditions. Earnings generally are higher in the North Central and Northeast regions than in the West and the South, but there are exceptions. Keep in mind that the cities that offer the highest earnings are those in which it is most expensive to live.

Differing pay scales among establishments, unionization, seniority, and quality of performances are other factors that help explain why the earnings of individuals in the same occupation may vary greatly.

But the industry in which a job is located may be the most important influence of all. Unskilled jobs invariably are at the bottom of the pay structure in an industry. Yet unskilled workers in a high-paying industry may earn more than skilled workers in a low-paying industry. Janitors in petroleum refining, for example, are paid more, on average, than workers in the most skilled production occupations of the men's suit industry.

Growing concern over the persistence of earnings differences between women and men has brought the issue of pay equity into the limelight. It is clear that no single factor accounts for the sizable gap between men's and women's earnings. Many factors are at work. Nonetheless, the concentration of women in the lower paying occupations and industries emerges as one of the most important reasons that women in general earn less than men. For reasons that are not fully understood, the jobs that most women hold are generally paid at lower rates than jobs held by men.

The accompanying chart shows how wide the earnings spread within an occupation can be. Based on 1982 data from the Bureau's annual survey of professional, administrative, technical, and clerical pay, the chart depicts the range in annual earnings for three occupations: Accountants, attorneys, and chemists. Note that the chart shows six bars each for accountants and attorneys and seven for chemists. These reflect different work levels, starting with entry level jobs and continuing up the career ladder to the most complex and responsible positions within the occupation.

The very broad earnings spread shown here is characteristic of creative and highly technical jobs that require innovative thinking or special knowledge. By contrast, the earnings spread for some occupational groups is relatively narrow. Such is the case for maintenance craft

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workers including carpenters, electricians, machinists, machinery repairers, and millwrights—largely because pay rates in these occupations are commonly set by labor-management agreements at a single rate for experienced workers. The earnings spread in clerical occupations also tends to be narrow.

The accompanying chart, based on data from the Current Population Survey, shows the earnings distribution of bookkeepers who were employed full time in 1982. Bookkeepers' earnings, like those of clerical workers in general, cluster tightly around the median (the midpoint in a distribution). Half of all full-time bookkeepers earned less than $13,000 in 1982 and half earned more. Expressing the data another way, the shaded area under the curve indicates that one-half of all full-time bookkeepers were in the $10,000–$16,000 earnings range in 1982, while one-fourth earned less than $10,000 and one-fourth earned more than $16,000. Earnings of the lowest paid bookkeepers (the lowest 10 percent) were under $8,000, while those of the highest paid bookkeepers (the highest 10 percent) exceeded $21,000. In other words, only 1 bookkeeper in 10 made as little as $8,000 or as much as $21,000 in 1982.

This edition of the *Handbook* is the first to use these data from the Current Population Survey to show the spread of earnings within an occupation. Many statements indicate what median earnings of full-time workers were in 1982, and describe the earnings of the middle 50 percent of workers, the lowest 10 percent, and the highest 10 percent. The data relate to earnings from wages and salaries only; earnings from self-employment—which tend to be higher than earnings from salaries—are not included.

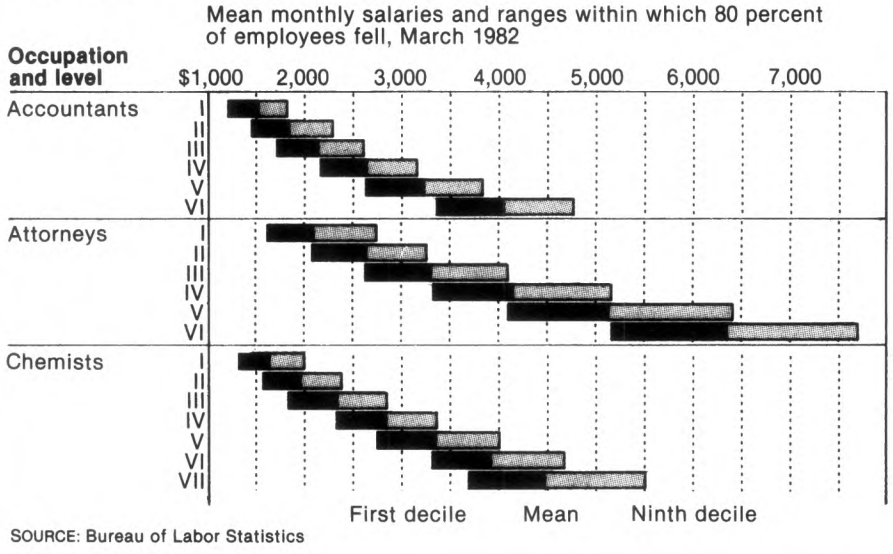
About 9 out of 10 workers receive a wage or salary. Often, wage and salary workers who work overtime, irregular hours, or the night shift receive an additional percentage of their regular wage or salary.

Some workers, such as waiters and waitresses, also receive tips based on the services they provide to customers. Automobile sales workers and real estate agents are among workers who are paid a commission—a percent of the amount they sell. Factory workers are sometimes paid a piece rate—a set amount for each item they produce.

About 10 percent of all workers are in business for themselves and earn self-employment income instead of, or in addition to, a wage or salary. (Income from self-employment is that amount which exceeds the expenses incurred.) Physicians, barbers, photographers, and lawyers are examples of workers who are frequently self-employed.

Many occupations offer a chance to supplement wage or salary income from a regular job with self-employment income. For example, electricians and carpenters often do small jobs during evenings or weekends, and many dental laboratory technicians "moonlight" in home laboratories. Typists, secretaries, graphic artists, and writers all have skills that permit them to earn extra income on a freelance basis.

Within an occupation are workers whose jobs differ in complexity and whose pay varies accordingly.



SOURCE: Bureau of Labor Statistics

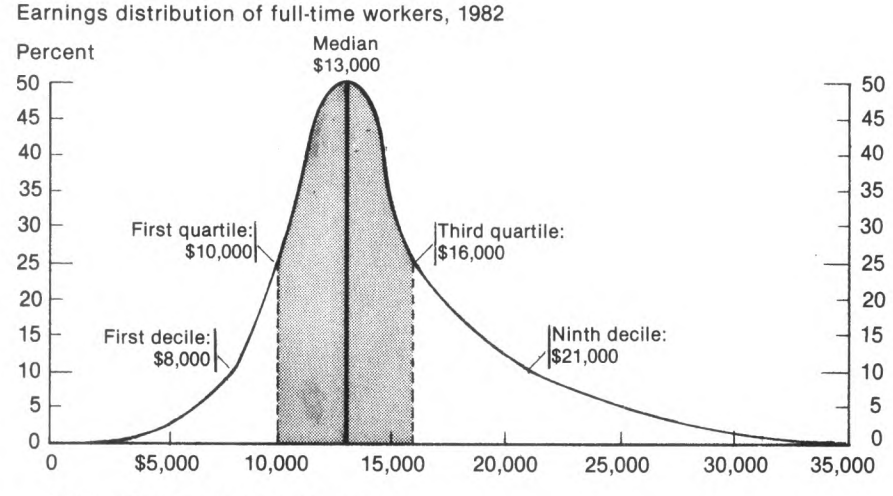
Most workers receive a variety of employer-paid benefits in addition to pay for time worked. Benefits such as paid vacations and holidays, health insurance, and pensions are an important part of the total pay package. Some employers offer stock options and profit-sharing plans, saving plans, and bonuses. Often, the importance of employee benefits is not fully appreciated by jobseekers entering the labor market for the first time; for example, they may not be aware of the dollar value of their health insurance—what it would cost to purchase equivalent coverage directly from an insurance company.

Workers in many occupations receive part of their earnings in the form of goods and services, or payments in kind. Sales workers in department stores, for example, often receive discounts on merchandise. Some private household workers receive free meals and housing. Flight attendants and other airline employees often are entitled to reduced fares for themselves and their families. Workers in other jobs may receive uniforms, business expense accounts, or use of a company car.

Related occupations. If you find that an occupation appeals to you, you also may wish to explore the jobs listed in this section. Usually, the related occupations are those that require similar aptitudes, interests, and education and training.

Sources of additional information. The *Handbook* is only one source of career information. Many associations, government agencies, unions, and other organizations provide useful information on careers. In this section, names and addresses of various organizations are listed to help you further your research into careers that interest you.

Half of all bookkeepers earned between $10,000 and $16,000 in 1982.



SOURCE: Bureau of Labor Statistics

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Where To Go For More Information

Whether you have questions about a particular job or are trying to compare various fields, the *Occupational Outlook Handbook* is a good place to begin. The *Handbook* will answer many of your initial questions. But remember that it is only one of many sources of information about jobs and careers. After reading a few *Handbook* statements, you may decide that you want more detailed information about a particular occupation. You may want to find out where you can go for training, or where you can find this kind of work in your community. If you are willing to make an effort, you will discover that a wealth of information is available.

Sources of Career Information

Professional societies, trade associations, labor unions, business firms, and educational institutions put out a great deal of free or low-cost career material. Many of these organizations are identified in the Sources of Additional Information section at the end of every *Handbook* statement.

If you want information for an occupation not covered in the *Handbook,* check the directories in your library's reference section for the names of organizations that may provide career materials. There are directories that list organizations, firms, and individuals in fields as diverse as publishing, advertising, banking, insurance, retailing, manufacturing, health care, energy, the environment, performing arts, social welfare, education, training and development, management consulting, and much more. Since there are thousands of directories covering a wide variety of fields, you may want to begin by looking in the *Guide to American Directories* or *The Directory of Directories.* Another good starting point is the *Encyclopedia of Associations,* a multivolume publication that lists thousands of trade associations, professional societies, labor unions, and fraternal and patriotic organizations.

The National Audiovisual Center, a central source for all audiovisual material produced by the U.S. Government, provides free lists of material available for rental or purchase. Subject areas include jobs and careers. Contact the National Audiovisual Center, General Services Administration, Information Services Section, Washington, D.C. 20409. Phone: (301) 763–1896.

Carefully assess any career materials you obtain. Keep in mind the date and source, in particular. Material that is too old may contain obsolete or even misleading information. Be especially cautious about accepting information on employment outlook, earnings, and training requirements if it is more than 5 years old. The source is important because it affects the content. Although some occupational materials are produced solely for the purpose of objective vocational guidance, others are produced for recruitment purposes. You should be wary of biased information, which may tend to leave out important items, overglamorize the occupation, overstate the earnings, or exaggerate the demand for workers.

Libraries, career centers, and guidance offices are important sources of career information. Thousands of books, brochures, magazines, and audiovisual materials are available on such subjects as occupations, careers, self-assessment, and job hunting. Your school library or guidance office is likely to have some of this material; ask the staff for help. Collections of occupational material also can be found in public libraries, college libraries, learning resource centers, and career counseling centers.

Begin your library search by looking in an encyclopedia under "vocations" or "careers," and then look up specific fields. The card catalog will direct you to books on particular careers, such as architect or plumber. Be sure to check the periodical section, too. You'll find trade and professional magazines and journals in specific areas such as automotive mechanics or interior design. Many libraries and career centers have pamphlet files for specific occupations. Collections of occupational information may also include nonprint materials such as films, filmstrips, cassettes, tapes, and kits. Computerized occupational information systems enable users to obtain career information instantly. In addition to print and nonprint materials, most career centers and guidance offices offer individual counseling, group discussions, guest speakers, field trips, and career days.

Counselors play an important role in providing career information. Vocational testing and counseling are available in a number of places, including:

—guidance offices in high schools.

—career planning and placement offices in colleges.

—placement offices in vocational schools.

—vocational rehabilitation agencies.

—counseling services offered by community organizations, commercial firms, and professional consultants.

—Job Service offices affiliated with the U.S. Employment Service.

The reputation of a particular counseling agency should be checked with professionals in the field. As a rule, counselors will not tell you what to do. Instead, they are likely to administer interest inventories and aptitude tests, interpret the results, talk over various possibilities, and help you explore your options. Counselors are familiar with the job market and also can discuss entry requirements and costs of the schools, colleges, or training programs that offer preparation for the kind of work in which you are interested. Most important of all, a counselor can help you consider occupational information in relation to your own abilities, aspirations, and goals.

Don't overlook the importance of **personal contacts.** Talking with people is one of the best ways of learning about an occupation. Most people are glad to talk about what they do and how well they like their jobs. Have specific questions lined up; you might question workers about their personal experiences and knowledge of their field. By asking the right questions, you will find out what kind of training is really important, how workers got their first jobs as well as the one they're in now, and what they like and dislike about the work. These interviews serve several purposes: You get out into the business world, you learn about an occupation, you become familiar with interviewing, and you meet people worth contacting when you start looking for a job.

Sources of State and Local Information

State occupational information coordinating committees can help you locate information about job prospects in your State or area. By contrast, the *Handbook* provides information for the Nation as a whole. The committee may provide the information directly, or refer you to other sources. In many States, it can tell you where you can go to use the State's career information delivery system (CIDS).

These systems, currently in place in most States, provide national, State, and local information to individuals who are exploring careers or searching for jobs. They serve users in a wide variety of settings—secondary schools, post-secondary institutions, libraries, job training sites, Job Service offices, and vocational rehabilitation centers.

Using a variety of delivery modes including on-line computer, microcomputer, printed material, needlesort, microfiche, and toll-free hotline, these systems provide information on occupations, educational opportunities, student financial aid, apprenticeships, and the military.

To find out what kinds of career materials have been developed for your State, contact the director of the State occupational information coordinating committee. Their addresses and telephone numbers are listed at the end of this section of the *Handbook.*

Employment security agencies in all 50 States, the District of Columbia, and Puerto Rico develop detailed information about the labor market. Typically, State agencies publish reports that deal with current and projected

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employment, characteristics of the work force, changes in State and area economic activities, and the employment structure of important industries. Major statistical indicators of labor market activity are released on a monthly, quarterly, and annual basis. To learn which studies, reports, and analyses are available for a particular State, contact the chief of research and analysis in the State employment security agency. Their addresses and telephone numbers are listed at the end of this section.

Sources of Education and Training Information

As a rule, professional or trade associations can provide lists of schools that offer career preparation in a particular field—operations research, publishing, or arts management, for example. Whenever possible, the Sources of Additional Information section at the end of every *Handbook* statement directs you to organizations that can provide training information.

For general information, a library, career center, or guidance office may be the best place to look; all of them ordinarily have collections of catalogs, directories, and guides to education and training opportunities. Computerized career information systems available in many schools, colleges, and Job Service offices generally provide information on education and training, student financial aid, and related matters.

A number of handbooks gives pertinent information on courses of study, admissions requirements, expenses, and student financial aid at the Nation's 2-year and 4-year colleges and universities. School and public libraries almost always have copies, as do large bookstores. Remember that these directories are updated and revised frequently; be sure to use the most recent edition. Libraries and guidance offices often have collections of college catalogs as well.

Postsecondary Schools with Occupational Programs, a publication of the U.S. Department of Education's National Center for Education Statistics, lists vocational-technical institutes, trade and technical schools, business schools, and other institutions—such as hospitals—that provide career training. Dozens of vocational areas are included—accounting, automotive mechanics, cosmetology, graphic arts, radio and television repair, truck driving, welding, and more. The 1982 edition may be available in counseling centers or large public libraries, or may be purchased for $9.50 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Specify GPO stock number 065–000–00192–6.

Directory of Educational Institutions, an annual publication, lists schools accredited by the Association of Independent Colleges and Schools (AICS). Most AICS-accredited institutions are business schools. They offer programs in secretarial science, business administration, accounting, data processing, court reporting, paralegal studies, fashion merchandising, travel/tourism, culinary arts, drafting, electronics, and more. For a copy of the *Directory,* write: Association of Independent Colleges and Schools, 1 Dupont Circle, NW., Suite 350, Washington, D.C. 20036. Phone: (202) 659–2460.

Allied Health Education Directory is published annually by the American Medical Association (AMA) and lists programs for health professions training that meet the standards of the AMA Committee on Allied Health Education and Accreditation (CAHEA). Currently, CAHEA accredits training programs for 26 occupations including diagnostic medical sonographer, physician assistant, medical record administrator, nuclear medicine technologist, perfusionist, and radiographer. Ordering information for the current edition of the *Directory* is available from: Department of Allied Health Education and Accreditation, 535 N. Dearborn St., Chicago, Illinois 60601.

Information on private trade and technical schools is available from the National Association of Trade and Technical Schools (NATTS). Among their many publications are *Handbook of Trade and Technical Careers and Training, How to Choose a Career and a Career School,* and *College Plus: Put Your Degree to Work with Trade and Technical Skills*. For a complete list, contact NATTS at 2021 K St. NW., Washington, D.C. 20006. Phone: (202) 296–8892.

The National Home Study Council supplies information about home study programs. They distribute *Directory of Accredited Home Study Schools* (free) and *There's a School in Your Mail Box* ($5.00, including postage). Requests for these publications should be directed to National Home Study Council, 1601 18th St. NW., Washington, D.C. 20009. Phone (202) 234–5100.

Labor unions and school guidance offices can provide information about apprenticeships. Local Job Service offices usually have at least one counselor familiar with apprenticeship programs in the area. In some cities, Apprenticeship Information Centers (AIC's) affiliated with the U.S. Employment Service furnish information, counseling, and aptitude testing, and direct people for more specific help to union hiring halls, Joint Apprenticeship Committees, and employer sponsors. The local Job Service can tell you whether there's an AIC in your community.

Sources of Financial Aid Information

If possible, consult a high school guidance counselor or college financial aid officer for advice on sources of financial aid. Don't neglect any possibility, for many organizations offer scholarships, fellowships, grants, loans, and work-study programs. Study the directories and guides to sources of student financial aid available in guidance offices and public libraries. Many career information systems provide information on financial aid.

Particularly useful is the American Legion's *Need a Lift?,* a booklet containing career and scholarship information for both undergraduate and graduate students. The 1983 edition costs $1.00 prepaid (includes postage) and can be obtained from: American Legion, Attn: Emblem Sales, P.O. Box 1055, Indianapolis, Ind. 46206.

Meeting College Costs, a College Board publication that is updated annually, explains how to apply for student financial aid. High school students should ask their guidance counselors for the current edition. A listing of College Board publications on student financial aid may be obtained from: College Board Publication Orders, Dept. A, Box 886, New York, N.Y. 10101.

The Federal Government provides several kinds of financial assistance to students: Grants, loans, work-study, and benefits. Information about programs administered by the U.S. Department of Education is presented in a pamphlet entitled, *Five Federal Financial Aid Programs, 1983–84; A Student Consumer's Guide*. This pamphlet is revised every year; request the current edition by calling (301) 984–4070, or by writing to: Pell Grants, P.O. Box 84, Washington, D.C. 20044.

Federal financial aid for students in the health professions is administered by the U.S. Department of Health and Human Services. Currently, major programs include Health Education Assistance Loans (HEAL), Health Profession Student Loans, Nursing Student Loans, and National Health Service Corps Scholarships. The financial aid office at the school in which you are enrolled, or plan to enroll, can provide information on eligibility requirements and application procedures. Information about National Health Service Corps Scholarships also can be obtained by calling (301) 443–1650 between 8:30 a.m. and 5:00 p.m. Eastern time, Monday through Friday, except Federal holidays, or by writing to: NHSC Scholarships, Parklawn Building, Room 17A–31, 5600 Fishers Lane, Rockville, Md. 20857.

Some student aid programs are designed to assist specific groups: Hispanics, blacks, native Americans, or women, for example. *Higher Education Opportunities for Minorities and Women: Annotated Selections,* published annually by the U.S. Department of Education, is a useful guide to organizations that offer loan, scholarship, and fellowship assistance, with special emphasis on aid for minorities and women. Opportunities for financial aid are listed by field of study, including architecture, arts and science, business, education, engineering and science, health, international affairs, journalism, law, political science and public administration, psychology, sociology, social work, speech pathology and audiology, and theology. Educational opportunities with the Armed Forces are also described. This publication can be found in many libraries and guidance offices, or may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price for the 1982 edition is $5.00 and the GPO stock number is 065–000–00175–6. The 1983 edition is forthcoming.

Career and Counseling Information for Special Groups

Certain groups of jobseekers face special difficulties in obtaining suitable and satisfying employment. All too often, veterans, youth, handicapped persons, minorities, and women experience difficulty in the labor market. The

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reasons for job market disadvantage vary, of course. People may have trouble setting career goals and looking for work for reasons as different as a limited command of English, a prison record, or lack of self-confidence. Some people are held back by their background—by growing up in a setting that provided only a few role models and little exposure to the wide range of opportunities in the world of work.

A growing number of communities have career counseling, training, and placement services for people with special needs. Programs are sponsored by a variety of organizations, including churches and synagogues, nonprofit organizations, social service agencies, the Job Service, and vocational rehabilitation agencies. Some of the most successful programs provide the extensive support that disadvantaged jobseekers require. They begin by helping clients resolve personal, family, or other fundamental problems that prevent them from finding or keeping a suitable job. Some agencies that serve special groups provide an array of supportive services designed to help people find and keep jobs.

Agencies that provide employment counseling as well as other kinds of assistance are identified in *Directory of Counseling Services,* a publication that lists accredited or provisional members of the International Association of Counseling Services, Inc. (IACS), an affiliate of the American Association for Counseling and Development. The 1981–82 edition is available for $6 (including postage) from IACS at 5999 Stevenson Ave., Suite 307, Alexandria, Va. 22304. Phone: (703) 823–9800.

Women's centers are an excellent resource for women seeking employment and counseling assistance. Many women's centers are located on college campuses. Some of these centers have a primarily academic orientation, sponsoring historical research and policy studies, for example. Others emphasize direct service to women in the community through outreach programs and counseling and job placement services. Still others offer vocational training. Women's centers are also operated by community organizations. Many of these centers emphasize nontraditional jobs for women, and almost all provide information and referral services.

Most States and many cities and counties have commissions or councils for women, many of which are actively engaged in improving employment opportunities for women in their area. A number of commissions have prepared resource directories for women, and a few operate employment or counseling programs.

Resource materials for women abound. Publications of the Women's Bureau of the U.S. Department of Labor, for example, include *Job Options for Women in the 80's* and *A Woman's Guide to Apprenticeship.* Single copies of each may be obtained, while the supply lasts, by sending a self-addressed mailing label to: Women's Bureau, U.S. Department of Labor, Room S–3005, 200 Constitution Ave., NW., Washington, D.C. 20210. Phone: (202) 523–6668.

Women's Handbook, a publication of the U.S. Small Business Administration (SBA), describes services available for women seeking to enter the ranks of small business owners. It is available from SBA offices nationwide. For addresses and telephone numbers of SBA field offices, look under "United States Government" in your local telephone directory. The publication may also be requested from: Consumer Information Center, Pueblo, Colo. 81009.

Professional Women's Groups Providing Employment Assistance to Women, a 1983 publication of the American Association of University Women (AAUW), is available for $2.00 (includes postage) from AAUW Sales, 2401 Virginia Ave., NW., Washington, D.C. 20037. Phone: (202) 785–7772. AAUW issues a number of other materials, including *A Job Hunter's Kit,* designed for women reentering the labor force, recent college graduates, and those interested in a mid-career change. Write for a current publications list.

Where the Jobs Are: Selected Careers for Women is published by the Business and Professional Women's Foundation (BPW). For information about the current edition, and a list of other BPW materials on women and work, send a stamped, self-addressed envelope to Publications List, BPW Foundation, 2012 Massachusetts Ave., NW., Washington, D.C. 20036. Phone: (202) 293–1200. Bibliographies and information sheets on women's employment issues are available free of charge from the Marguerite Rawalt Resource Center at the same address.

Other career resources include *Directory of Special Opportunities for Women,* published in 1981 by Garrett Park Press (Garrett Park, Md.). The *Directory* lists sources of career training, financial aid, and other assistance for women entering or reentering the labor force. The publication also identifies employment-oriented networks, programs, and organizations for women. Look for it in a library, guidance office, or counseling center.

Suit Yourself . . . Shopping for a Job is self-help publication, with tips, techniques, and self-assessment tools for organizing a job search. Published in 1980 by Wider Opportunities for Women (WOW), a national nonprofit women's employment organization, it can be purchased for $7.50 (includes postage) from WOW, 1325 G St. NW., Washington, D.C. 20005. WOW issues other materials as well; request a current publications list. Phone: (202) 783–5155.

Directory of Special Programs for Minority Group Members: Career Information Services, Employment Skills Banks, Financial Aid Sources (Garrett Park, Md.: Garrett Park Press), now in its third edition, lists thousands of educational, career, and other services and programs that help minority group members in their educational and career advancement

Career information for minority group members also appears in specialized magazines including *The Black Collegian* and *Minority Engineer.*

The Veterans Administration issues a wide variety of materials on career decisionmaking, student financial aid, job search, and other employment-related topics. Contact: Department of Veterans Benefits (232A), Veterans Administration Central Office, 810 Vermont Ave., NW., Washington, D.C. 20420. Phone: (202) 389–2972.

The 1981–82 edition of *Directory of Organizations Interested in the Handicapped* lists more than 150 voluntary and public agencies in the rehabilitation field and briefly describes their purpose, programs, and publications. Copies of the *Directory,* and many other print and audiovisual materials on employment of people with disabilities, may be obtained from: President's Committee on Employment of the Handicapped, Washington, D.C. 20210. Phone: (202) 653–5044.

State vocational rehabilitation agencies are an important source of career and counseling information for people with disabilities; they are listed in the *Directory.*

Job Opportunities for the Blind, a project of the National Federation of the Blind in partnership with the U.S. Department of Labor, operates a nationwide toll-free number: 1–800–638–7518. Services offered by the organization include recorded materials, a listing of job openings, and seminars on employment-related topics for blind and deaf-blind applicants.

Employment counseling and placement services for older workers have been established in some communities. The area agency on aging can tell you whether there is a senior employment program in your community. Local offices of the State employment service should also be able to provide information about job placement services for older workers. Information about the small but growing network of nonprofit senior employment agencies can be obtained from the National Association of Older Worker Employment Services, 600 Maryland Ave., SW., West Wing 100, Washington, D.C. 20024. Phone: (202) 479–1200.

Federal laws, Executive Orders, and selected Federal grant programs bar discrimination in employment based on race, color, religion, sex, national origin, age, and handicap. Employers in the private and the public sectors, Federal contractors, and grantees are covered by these laws. The U.S. Equal Employment Opportunity Commission (EEOC) is responsible for administering many of the programs that prohibit discrimination in employment. Information about how to file a charge of discrimination is available from local EEOC offices around the country. Their addresses and telephone numbers are listed in telephone directories under U.S. Government, EEOC, or from: Equal Employment Opportunity Commission, 2401 E St. N.W., Washington, D.C. 20507. Phone: (202) 634–6922.

Information on Federal laws concerning fair labor standards—including the minimum wage law—and equal employment opportunity can be obtained from the Office of Information and Consumer Affairs, Employment Standards Administration, U.S. Department of Labor, Room C–4331, 200 Constitution Ave., NW., Washington, D.C. 20210.

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Information on Finding a Job

These days, a well-planned job search is essential. For information on job openings, follow up as many leads as possible. Parents, neighbors, teachers, and counselors may know of jobs. Check the want ads. Investigate your local Job Service office and find out whether private or nonprofit employment agencies in your community can help you.

Where to Find Out About Job Openings

- Job Service offices
- Civil Service announcements (Federal, State, local)
- Classified ads
  - —Local and out-of-town newspapers
  - —Professional journals
  - —Trade magazines
- Labor unions
- Professional associations (State and local chapters)
- Libraries and community centers
- Women's counseling and employment programs
- Youth programs
- School or college placement services
- Employment agencies and career consultants

Merchandising Your Job Talents, a 21-page pamphlet prepared by the U.S. Department of Labor, offers tips on organizing your job search, writing a resume, taking preemployment tests, and making the most of the interview. The pamphlet is available at most Job Service offices, or may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price of the 1983 edition is $2.75 and the stock number is 029–014–00212–7.

Informal job search methods. Informal methods of job search are the most popular, and also the most effective. Informal methods include direct application to employers with or without referral by friends or relatives. Jobseekers locate a potential employer and file an application, often without certain knowledge that an opening exists.

You can find targets for your informal search in several ways. The *Yellow Pages* and local chambers of commerce will give the names and addresses of appropriate firms in the community where you wish to work. You can also get listings of most firms in a specific industry—banking, insurance, and newspaper publishing, for example—by consulting one of the directories on the reference shelf of your public library. Friends, relatives, and people you meet during your job search are likely to give you ideas about places where you can apply for a job.

Want ads. The "Help Wanted" ads in a major newspaper contain hundreds of job listings. As a job search tool, they have two advantages: They are cheap and easy to acquire, and they often result in successful placement. There are disadvantages as well. Want ads give a distorted view of the local labor market, for they tend to underrepresent small firms. They also tend to overrepresent certain occupations, such as clerical and sales jobs. How helpful they are will depend largely on the kind of job you seek.

Bear in mind that want ads do not provide complete information; many give little or no description of the job, working conditions, and pay. Some omit the identity of the employer. In addition, firms often run multiple listings. Some ads offer jobs in other cities (which do not help the local worker); others advertise employment agencies rather than employment.

If you use want ads, keep the following suggestions in mind:

—Don't rely exclusively on want ads; follow up other leads, too.

—Answer ads promptly. The opening may be filled before the ad stops running.

—Follow the ads diligently. Checking them every day as early as possible gives you the best advantage over other applicants,which may mean the difference between a job and a rejection.

—Don't expect too much from "blind ads" that do not reveal the employer's identity. Employers use blind ads to avoid being swamped with applicants, or to fill a particular vacancy quietly and confidentially. The chances of finding a job through blind ads tend to be slim.

—Be cautious about answering "no experience necessary" ads. Most employers are able to fill job openings that do not require experience without advertising in the newspaper. This type of ad may mean that the job is hard to fill because of low wages or poor working conditions, or because it is straight commission work.

Public employment service. The public employment service, also called the Job Service, is often overlooked in finding out about local job openings. Run by the State employment security agencies under the direction of the Labor Department's U.S. Employment Service, the 1,700 local Job Service offices provide help without charge. Job Service staff help jobseekers find employment and help employers find qualified workers. To find the office nearest you, look in the State government telephone listings under "Job Service" or "Employment."

Job matching and referral. Upon entering a Job Service center, an applicant is interviewed to determine the type of work for which he or she indicates an interest and aptitude. The interviewer determines if the applicant is "job ready" or if counseling and testing services are needed. Applicants who know what kind of work they are qualified for may spend some time examining the Job Bank, a computerized listing of public and private sector job openings that is updated every day. The Job Bank is self-service; applicants examine a book or microfilm viewer and select openings that interest them. Afterwards, a Job Service staff member may describe a particular job opening in some detail and arrange for an interview with the prospective employer.

Counseling and testing. Job Service centers also help jobseekers who are uncertain about their qualifications and the kind of work they want. Most centers are staffed with a specialist who furnishes complete counseling and testing services. Counselors help jobseekers choose and prepare for an occupation based on their qualifications and interests. They aim to help individuals become aware of their job potential and then develop it. The testing program measures occupational aptitudes, clerical and literary skills, and occupational interests. Testing and counseling before job referral ensure a better match between applicant and job.

Services for special groups. By law, veterans are entitled to priority in interviewing, counseling, testing, job development, and job placement. Special counselors called veterans employment representatives are trained to deal with the particular problems of veterans, who

JOB INTERVIEW TIPS

Preparation:
- Learn something about the company
- Have specific job or jobs in mind
- Review in your mind your qualifications for the job
- Be prepared to answer broad questions about yourself

Personal Appearance:
- Well groomed
- Suitable dress
- No chewing gum
- Only smoke when invited

The Interview:
- Answer each question as well as you can
- Be prompt in giving responses
- Be well mannered
- Use good English and avoid the use of slang
- Be cooperative and enthusiastic
- Don't be afraid to ask questions

Test (if employer gives one):
- Listen carefully to instructions
- Read each question carefully
- Write legibly and clearly
- Budget your time wisely and don't stay on one question too long

Information to Take With you:
- Social Security number
- Driver's license number
- Education, which should include school name or number and address; curriculum; dates of attendance; highest grade completed or date of graduation
- Previous employment (summer, work-study, or part-time). Include the following for each job; name of employer; address of job; job title; dates of employment
- Hobbies or special interests
- Special skills
- References. Usually an employer requires three references. Get permission from people before using their names. If you can avoid it, do not use the names of relatives. For each reference, give the following information: name; address; telephone number; occupation

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may find it difficult to readjust to civilian life. Although such veterans often face multiple problems, joblessness alone is a major barrier to resuming an ordinary life. Special help for disabled veterans begins with outreach units in each State, whose job it is to identify jobless disabled veterans and make them aware of the many kinds of assistance available.

A special effort is made to assist youth between the ages of 16 and 22—students, dropouts, and graduates entering the labor market. Youthful applicants are tested, counseled, and aided in choosing work that suits their abilities and interests. Each year, local Job Service centers conduct a Summer Youth Program to provide summer jobs in city, county, and State government agencies for low-income youth. In addition, the Job Corps, with more than 100 centers throughout the United States, provides an opportunity for young people to learn a skill or obtain the educational base needed to advance in society.

The Job Service also refers applicants to opportunities under the Job Training Partnership Act (JTPA) of 1982, which replaces the Comprehensive Employment and Training Act (CETA) as the principal Federal legislation in this field. JTPA focuses on preparing economically disadvantaged persons for jobs in the private sector.

Private employment agencies. In the appropriate section of the classified ads or the telephone book you can find numerous advertisements for private employment agencies. All are in business to make money, but some offer higher quality service and better chances of successful placement than others.

The three main places in which private agencies advertise are newspaper want ads, the *Yellow Pages,* and trade journals. Telephone listings give little more than the name, address, phone number, and specialty of the agency, while trade journals generally advertise openings for a particular occupation, such as accountant or computer programmer. Want ads, then, are the best source of general listings of agencies.

These listings fall into two categories—those offering specific openings and those offering a general promise of employment. You should concentrate on the former and use the latter only as a last resort. With a specific opening mentioned in the ad, you have greater assurance of the agency's desire to place qualified individuals in suitable jobs.

When responding to such an ad, you may learn more about the job over the phone. If you are interested, visit the agency, fill out an application, present a resume, and talk with an interviewer. The agency will then arrange an interview with the employer if you are qualified, and perhaps suggest alternative openings if you are not.

Most agencies operate on a commission basis, with the fee contingent upon a successful match. The employer pays agencies advertising "no fees, no contracts" and the applicant pays nothing. Many agencies, however, do charge applicants. You should find out the exact cost before using the service.

Community agencies. A growing number of nonprofit organizations throughout the Nation provide counseling, career development, and job placement services. These agencies generally concentrate on services for a particular labor force group—women, youth, minorities, ex-offenders, or older workers, for example. It's up to you to discover whether your community has such agencies and whether they can help you. The local Job Service center should be able to tell you whether such an agency has been established in your community. Your church, synagogue, or local library may have the information, too.

College career planning and placement offices. Career planning and placement offices at colleges and universities offer valuable services to students and alumni for a modest fee. Many services, in fact, are free. College placement offices operate as employment agencies, matching applicants with suitable jobs and lining up interviews. On large campuses, for example, they set up schedules and facilities for interviews with industry recruiters. And many offices maintain lists of local part-time, temporary, and summer jobs.

College career planning and placement offices also provide services related to counseling and job search techniques. They may, for example, maintain a career resource library; administer tests that enable students to identify and evaluate interests, work values, and skills; conduct workshops on such topics as job search strategy, resume writing, letterwriting, and effective interviewing; critique drafts of resumes and videotapes of mock interviews; maintain files of resumes and references; and conduct job fairs.

State and Local Information. For each State, the District of Columbia, and Puerto Rico, the following list provides the title, address, and telephone number of two principal sources of labor market and career information: The State employment security agency's chief of research and analysis, and the director of the State Occupational Information Coordinating Committee (SOICC).

Alabama

Chief, Research and Statistics, Department of Industrial Relations, Industrial Relations Bldg., Room 427, 649 Monroe St., Montgomery, Ala. 36130. Phone: (205) 832–5263.

Director, Alabama Occupational Information Coordinating Committee, First Southern Towers, Suite 402, 100 Commerce St., Montgomery Ala. 36130. Phone: (205) 832–5737.

Alaska

Chief, Research and Analysis, Employment Security Division, Department of Labor, P.O. Box 1149, Juneau, Alaska 99811. Phone: (907) 465–4502.

Coordinator, Alaska Occupational Information Coordinating Committee, Pouch F—State Office Bldg., Juneau, Alaska 99811. Phone: (907) 465–2980.

Arizona

Chief, Labor Market Information, Research and Analysis, Department of Economic Security, 733-A, P.O. Box 6123, Phoenix, Ariz. 85035. Phone: (602) 255–3616.

Executive Director, Arizona State Occupational Information Coordinating Committee, 1535 West Jefferson, Room 345, Phoenix, Ariz. 85007. Phone: (602) 255–3680.

Arkansas

Assistant Director, Research and Analysis, Employment Security Division, P.O. Box 2981, Little Rock, Ark. 72203. Phone: (501) 371–1541.

Director, Arkansas State Occupational Information Coordinating Committee, P.O. Box 2981, Little Rock, Ark. 72203. Phone: (501) 371–3551.

California

Chief, Employment Data and Research Division, Employment Development Department, P.O. Box 1679, Sacramento, Calif. 95814. Phone: (916) 445–4434.

Executive Director, California Occupational Information Coordinating Committee, 1027 10th Street, No. 302, Sacramento, Calif. 95814. Phone: (916) 323–6544.

Colorado

Chief, Research and Development, Division of Employment and Training, Department of Labor and Employment, 1728 Lincoln St., Denver, Colo. 80203. Phone: (303) 839–5833, Ext. 43.

Director, Office of Occupational Information, Colorado Occupational Information Coordinating Committee, 218 Centennial Bldg., 1313 Sherman St., Denver, Colo. 80203. Phone: (303) 866–4488.

Connecticut

Director, Research and Information, Employment Security Division, Department of Labor, 200 Folly Brook Blvd., Wethersfield, Conn. 06109. Phone: (203) 641–4280.

Executive Director, Connecticut State Occupational Information Coordinating Committee, 90 Washington St., First Floor, Hartford, Conn. 06115. Phone: (203) 566–2502, 2503, 5047, 5699.

Delaware

Chief, Office of Planning, Research and Evaluation, Department of Labor, University Plaza Complex Office, Chapman Rd., Route 273, Newark, Del. 19702. Phone: (302) 368–6921.

Director, Delaware Occupational Information Coordinating Committee, Drummond Office Plaza, Suite 3303, Building No. 3, Newark, Del. 19711. Phone: (302) 368–6772.

District of Columbia

Chief, Branch of Labor Market Information, Department of Employment Services, 500 C St., N.W., Room 411, Washington, D.C. 20001. Phone: (202) 724–2414.

Executive Director, D.C. Occupational Information Coordinating Committee, 500 C St. NW., Suite 621, Washington, D.C. 20001. Phone: (202) 639–1083.

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Florida

Director, Research and Analysis, Division of Labor and Employment Security, Coldwell Bldg., Tallahassee, Fla. 32301. Phone: (904) 488–1048.

Director, Florida Occupational Information Coordinating Committee, 124 West Jefferson St., Tallahassee, Fla. 32301. Phone: (904) 224–3660.

Georgia

Director, Labor Information Systems, Department of Labor, 254 Washington St., SW., Atlanta, Ga. 30334. Phone: (404) 656–3177.

Executive Director, Georgia Occupational Information Coordinating Committee, 501 Pulliam St., SW., Room 339, Atlanta, Ga. 30312. Phone: (404) 656–3117.

Hawaii

Chief, Research and Statistics, Department of Labor and Industrial Relations, 830 Punchbowl St., Honolulu, Hawaii 96813. Phone: (808) 548–7639.

Executive Director, Hawaii State Occupational Information Cordinating Committee, 830 Punchbowl St., Room 205, Honolulu, Hawaii 96813. Phone: (808) 548–3496.

Idaho

Chief, Research and Analysis, Department of Employment, P.O. Box 35, Boise, Idaho 83735. Phone: (208) 384–2755.

Coordinator, Idaho Occupational Information Coordinating Committee, Len B. Jordan Bldg., Room 301, 650 W. State St., Boise, Idaho 83720. Phone: (208) 334–3705.

Illinois

Director, Research and Analysis Division, Bureau of Employment Security, Department of Labor, 910 S. Michigan Ave., Chicago, Ill. 60605. Phone: (312) 793–2317.

Executive Director, Illinois Occupational Information Coordinating Committee, 217 E. Monroe, Suite 203, Springfield, Ill. 62706. Phone: (217) 785–0789.

Indiana

Chief of Research and Statistics, Employment Security Division, 10 N. Senate Ave., Indianapolis, Ind. 46204. Phone: (317) 232–7701.

Director, Indiana Occupational Information Coordinating Committee, 17 W. Market St., 434 Illinois Bldg., Indianapolis, Ind. 46204. Phone: (317) 232–3625.

Iowa

Chief, Audit and Analysis, Department of Job Service, 1000 E. Grand Ave., Des Moines, Iowa 50319. Phone: (515) 281–5802.

Executive Director, Iowa State Occupational Information Coordinating Committee, 523 E. 12th St., Des Moines, Iowa 50319. Phone: (515) 281–8076.

Kansas

Chief, Research and Analysis, Department of Human Resources, Department of Labor, 401 Topeka Ave., Topeka, Kans. 66603. Phone: (913) 296–5058.

Director, Kansas Occupational Information Coordinating Committee, 512 W. 6th St., Topeka, Kans. 66603. Phone: (913) 296–5286.

Kentucky

Manager, Labor Market Research and Analysis, Department of Manpower Services, Cabinet for Human Resources, 275 E. Main St., Frankfort, Ky. 40621. Phone: (502) 564–7976.

Coordinator, Kentucky Occupational Information Coordinating Committee, 275 E. Main St., D.H.R. Bldg. 2nd Floor East, Frankfort, Ky. 40621. Phone: (502) 564–4258.

Louisiana

Chief, Research and Statistics, Department of Labor, P.O. Box 44094, Capital Station, Baton Rouge, La. 70804. Phone: (504) 342–3141.

Director, Louisiana State Occupational Information Coordinating Committee, 1000 Science Hwy., Baton Rouge, La. 70802. Phone: (504) 342–5149.

Maine

Director, Research and Analysis, Bureau of Employment Security, 20 Union St., Augusta, Maine 04330. Phone: (207) 289–2271.

Executive Director, Maine State Occupational Information Coordinating Committee, State House Station 71, Augusta, Maine 04333. Phone: (207) 289–2331.

Maryland

Director, Research and Analysis, Department of Human Resources, 1100 N. Eutaw St., Baltimore, Md. 21201. Phone: (301) 383–5000.

Executive Director, Maryland Occupational Information Coordinating Committee, Jackson Towers, Suite 304, 1123 N. Eutaw St., Baltimore, Md. 21201. Phone: (301) 383–6350.

Massachusetts

Director, Job Market Research, Division of Employment Security, Hurley Bldg., Government Center, Boston, Mass. 02114. Phone: (617) 727–6556.

Executive Director, Massachusetts Occupational Information Coordinating Committee, One Ashburton Place, Room 2110, McCormack Bldg., Boston, Mass. 02108. Phone: (617) 727–9740.

Michigan

Director, Research and Statistics, Employment Security Commission, 7310 Woodward Ave., Room 516, Detroit, Mich. 48202. Phone: (313) 876–5445.

Executive Coordinator, Michigan Occupational Information Coordinating Committee, P.O. Box 30015, Lansing, Mich. 48909. Phone: (517) 373–0363.

Minnesota

Director, Research and Statistical Services, Department of Economic Security, 390 N. Robert St., St. Paul, Minn. 55101. Phone: (612) 296–6545.

SOICC Director, Department of Economic Security, 690 American Center Bldg., 150 E. Kellogg Blvd., St. Paul, Minn. 55101. Phone: (612) 296–2072.

Mississippi

Chief, Research and Statistics, Employment Security Commission, P.O. Box 1699, Jackson, Miss. 39205. Phone: (601) 961–7424.

SOICC Director, Vocational Technical Education, P.O. Box 771, Jackson, Miss. 39205. Phone: (601) 359–3412.

Missouri

Chief, Research and Statistics, Division of Employment Security, P.O. Box 59, Jefferson City, Mo. 65104. Phone: (314) 751–3215.

Director, Missouri Occupational Information Coordinating Committee, 421 E. Dunklin St., Jefferson City, Mo. 65101. Phone: (314) 751–3215, 3323.

Montana

Chief, Research and Analysis, Employment Security Division, Department of Labor and Industry, P.O. Box 1728, Helena, Mont. 59601. Phone: (406) 449–2430.

Program Manager, Montana State Occupational Information Coordinating Committee, Room C317 Cosgrove Bldg., Capitol Complex, Helena, Mont. 59620. Phone: (406) 449–2741.

Nebraska

Chief, Research and Statistics, Division of Employment, Department of Labor, P.O. Box 94600, State House Station, Lincoln, Nebr. 68509. Phone: (402) 475–8451.

Executive Director, Nebraska Occupational Information Coordinating Committee, 538 Nebraska Hall, University of Nebraska, Lincoln, Nebr. 68588. Phone: (402) 472–2062.

Nevada

Chief, Employment Security Research, Employment Security Department, 500 E. Third St., Carson City, Nev. 89713. Phone: (702) 885–4550.

Director, Nevada Occupational Information Coordinating Committee, Capitol Complex, Kinkead Bldg., Room 601, 505 E. King St., Carson City, Nev. 89710. Phone: (702) 885–4577.

New Hampshire

Director, Economic Analysis and Reports, Department of Employment Security, 32 S. Main St., Concord, N.H. 03301. Phone: (603) 224–3311, Ext. 251.

SOICC Director, New Hampshire Occupational Information Coordinating Committee, c/o Department of Employment and Training, 155 Manchester St., Concord, N.H. 03301. Phone: (603) 271–3156.

New Jersey

Director, Division of Planning and Research, Department of Labor, P.O. Box 2765, Trenton, N.J. 08625. Phone: (609) 292–2643.

Acting Staff Director, New Jersey Occupational Information Coordinating Committee, P.O. Box CN056, Trenton, N.J. 08625. Phone: (609) 292–2682.

New Mexico

Chief, Research and Statistics, Employment Services Division, P.O. Box 1928, Albuquerque, N. Mex. 87103. Phone: (505) 841–8645.

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Director, New Mexico State Occupational Information Coordinating Committee, 401 Broadway, N.E., Albuquerque, N. Mex. 87102. Phone: (505) 841–4496.

New York

Director, Research and Statistics, Department of Labor, State Campus, Bldg. 12, Albany, N.Y. 12240. Phone: (518) 457–6181.

SOICC Director, Department of Labor, State Campus Bldg. #12, Room 559A, Albany, N.Y. 12240. Phone: (518) 457–2930.

North Carolina

Director, Labor Market Information, Employment Security Commission, P.O. Box 25903, Raleigh, N.C. 27611. Phone: (919) 733–2936.

SOICC Director, Department of Administration, 112 W. Lane St., 218 Howard Bldg., Raleigh, N.C. 27611. Phone: (919) 733–6700.

North Dakota

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Tomorrow's Jobs

The number and kinds of jobs needed in tomorrow's economy will depend on the interplay of demographic, economic, social, and technological factors. Employment in some occupations will grow much faster than the average rate of growth; others will decline in importance. Some jobs will emerge as a result of new technologies; others will disappear. And the nature of the work in most occupations will surely undergo change. The Bureau of Labor Statistics analyzes the changing nature of the economy and the factors causing these changes and develops projections of future industry and occupational employment. Employment projections, by their nature, are imprecise and should not be solely relied upon in career decisionmaking. Nevertheless, projections can help you assess future opportunities in the occupations that interest you.

The *Handbook* presents information about the job outlook for many occupations. In this chapter, which provides background for those discussions, you will find information about expected changes in the population, the labor force, and employment in major industrial sectors and broad occupational groups. Finally, there is a brief discussion of the importance of replacement needs in the employment outlook.

Population

Changes in population are among the basic factors that will alter employment opportunities. Changes in the size and characteristics of the population cause changes in the amount and types of goods and services demanded. These changes also alter the size and characteristics of the labor force—the people who are working and who are looking for work—which in turn can influence the amount of competition for jobs in an occupation. Three important population factors are population growth, shifts in the age structure of the population, and movement of the population within the country.

Growth. The population of the United States has increased throughout this century. However, the rate of growth declined until the post-World War II "baby boom." During the late 1960's, the rate of population growth began to drop sharply and has remained at a low level since (chart 1).

In 1982, the population was about 232 million. It is expected to increase to about 260 million by 1995. The rate of growth will be faster during the 1980's (0.9 percent a year) than during the early 1990's (0.8 percent a year). Continued population growth will mean more consumers to provide with goods and services, causing greater demand for workers in many industries and occupations.

Age structure. Over time, the age structure of the population changes. Shifts in the age structure affect the job market in many ways. The low population growth of the 1960's and 1970's, for example, resulted in a decrease in the number of school age children in the 1970's. This decrease lowered the demand for educational services and employment opportunities in teaching. During the 1970's, as the large number of people born during the 1950's entered the labor force, competition increased for entry level jobs.

Through the mid–1990's, the age structure of the population will continue to shift and affect the job market. The number of children under 13 will increase as the large number of people born during the baby boom have children of their own. As the baby boom group ages, the number of people age 35 to 54 will increase. The number of people 65 and older will rise sharply because of the relatively high population growth before the 1930's and increases in life expectancy. Because of low population growth during the 1970's and 1930's, the number of 14- to 25-year-olds and 55- to 64-year-olds will decline by 1995.

Increases in the number of children will cause greater demand for elementary school education during the 1980's and secondary school education during the early 1990's. The increase in the number of older people will add to the demand for health services. Shifts in the age structure of the population also will affect the age structure of the labor force, discussed in a later section.

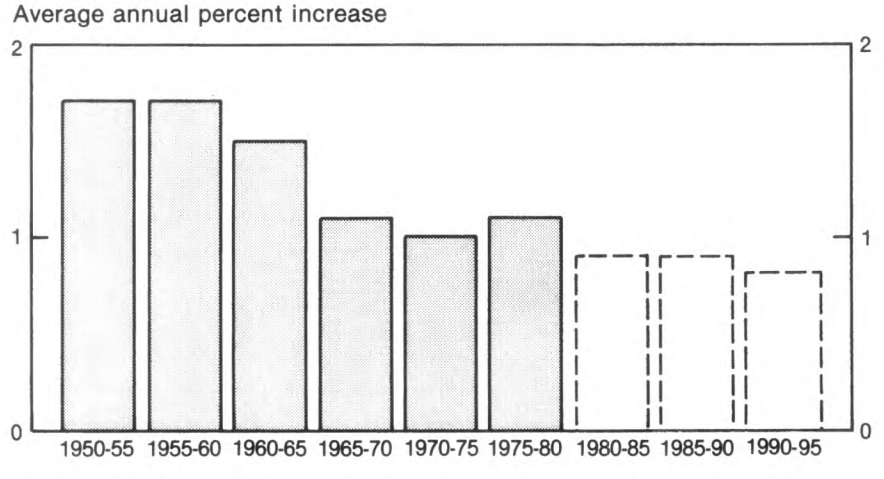
Movement of population. Population growth varies among the regions of the Nation. For example, between the 1970 and 1980 censuses, the population of the Northeast and North Central regions increased by 0.2 percent and 4.0 percent, respectively, compared with 20.0 percent in the South and 23.9 percent in the West. These differences reflect the movement of people to find new jobs, to retire, or for some other reasons. Chart 2 shows the expected changes in State populations between 1980 and 2000 if the movement of people during that period is similar to the movement between 1970 and 1980.

The West will continue to be the fastest growing region of the country, increasing about 45 percent between 1980 and 2000. In the South, the population will increase about 31 percent, with the largest absolute increase in population. The North Central region is expected to increase only about 2 percent between 1980 and 1990, and to decline about 1 percent from 1990 to 2000. The population of the Northeast region will decline about 6 percent. By the year 2000, the West and the South will have about 60 percent of the Nation's population, compared to about 52 percent in 1980.

The Northeast region will have the oldest age distribution; almost 15 percent of its population will be age 65 or older. The West will have the youngest age distribution; over 22 percent of the population will be under age 15 and about 45 percent will be between the ages of 15 and 44. The age distribution of the South and North Central regions will be similar to the national average.

Geographic shifts in the population alter the demand for and supply of workers in local job markets. In areas with a growing population, for example, demand for public services and construction is likely to increase. At the same time, more people looking for work in an area could increase competition for jobs. Therefore,

Chart 1.
The population will grow more slowly through the mid-1990's.



SOURCE: Bureau of the Census

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employment opportunities in an occupa- could differ greatly from national projec- is presented in the *Handbook*. Sources of formation about local job market conditions n be found in the section, "Where to Go for More Information."

Labor Force

The size and characteristics of the labor force determine the number and type of people competing for jobs. In addition, the size of the labor force affects the amount of goods and services that can be produced. Growth, alterations in the age structure, and rising educational levels are among the labor force changes that will affect employment opportunities through the mid–1990's.

Growth. In 1982, the civilian labor force—people with jobs and people looking in jobs—totaled about 110 million persons. The labor force will grow through the mid–1990's, but at a slower rate than in the 1960's and 1970's (chart 3). By 1995, the labor force is projected to be about 131 million—an increase of about 19 percent from the 1982 level.

Through the mid–1990's, the chief cause of labor force growth will be the continued though slower rise in the number and proportion of women who seek jobs. Women will account for nearly two-thirds of the labor force growth during 1982–95 (chart 4). Labor force growth will be slower than in the 1960's and 1970's because the low birth rates during those years will result in few young people entering the labor force.

Age structure. Through the mid–1990's, the number of people age 16 to 24 in the work force is projected to decline (chart 5). Fewer young entrants into the labor force may ease competition for entry level jobs. In fact, employers may have increasing difficulty in finding young workers. The decline in the number of young workers could be particularly important to the Armed Forces—the single largest employer of men in this age group.

The number of people age 25 to 54 in the labor force is expected to increase considerably, from about two-thirds of the labor force in 1982 to nearly three-fourths by 1995. The growing proportion of workers age 25 to 54 could result in higher productivity growth during this period than in the 1970's, since workers in that age group generally have work experience and tend to be more productive.

The number of people age 55 and over in the labor force is projected to decline slightly, reflecting the trend toward early retirement and the drop in the number of people age 55 to 65.

Education. Employers always wish to hire the best qualified persons available. This does not mean that they always choose those applicants who have the most education. However, individuals planning for a career should be aware of the continuing rise in the educational attainment of the work force. Between 1970 and 1982, for example, the proportion of the labor force age 18 to 64 with at least 1 year of college increased from 26 to 39 percent (chart 6). The increase in educational attainment reflects both the retirement of older workers, many of whom had little formal education, and the influx into the work force of young people who generally have a high level of formal education. Among workers age 25 to 34, for example, nearly half have completed at least 1 year of college.

The disadvantage that less educated workers suffer when seeking jobs is clearly shown in their unemployment rate. In 1982, the unemployment rate among 20- to 24- year- olds with less than 4 years of high school was 32.2 percent. The rate for those with 4 years of high school was about half that, 15.5 percent. The rates for those with 1 to 3 years of college and 4 or more years of college were only 9.6 and 5.6 percent, respectively. The connection between higher unemployment rates and low levels of education shows the importance of education in a job market that increasingly requires more training.

It is also important to note that a college degree no longer guarantees success in the job market. Between 1970 and 1982, employment of college graduates grew 103 percent. The proportion employed in professional, technical, and managerial occupations, however, declined because these occupations did not expand rapidly enough to absorb the growing supply of graduates. As a result, 1 out of 5 college graduates who entered the labor market between 1970 and 1982 took jobs not usually requiring a degree. This oversupply of graduates is likely to continue through the mid–1990's. Not all occupations requiring a college degree will be overcrowded, however. Good opportunities will exist for systems analysts and engineers, for example.

Despite widespread publicity about the poor job market for college graduates, a college degree is still needed for most high-paying and high-status jobs. Persons interested in occupations that require a college degree should not be discouraged from pursuing a career that they believe matches their interests and abilities, but they should be aware of job market conditions.

Employment

The previous two sections discussed trends in the population and the labor force that will affect employment opportunities. This section gives an overview of some other factors that will affect the level of employment.

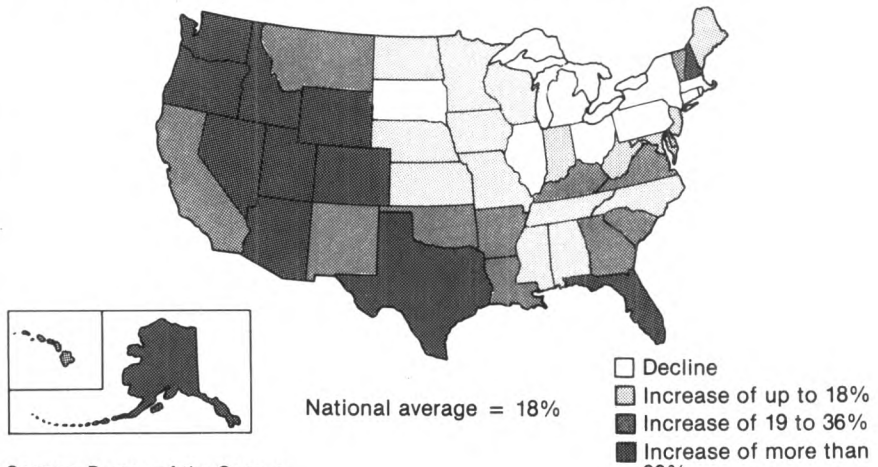
The number of jobs in particular industries and occupations depends in large part on the consumer, government, and business demand for goods and services produced by those industries and workers. In a simple example, there would be fewer jobs for barbers and cosmetologists if people chose to have their hair cut less often. However, because of the complexity of the economy, the connection between demand and employment generally is not simple, and a single change in demand can have far-reaching consequences.

Consumer desire and government regulation, for example, led to an effort by automobile manufacturers to improve the fuel efficiency of cars. To do this, auto manufacturers lightened cars by using plastic, aluminum, and specialty steel instead of standard iron and steel. This shift lowered the demand for goods from the iron and steel manufacturing industry as well as for the products of the iron and metallurgical coal mining industries and others that supply iron and steel manufacturers. Employment in those industries was adversely affected. At the same time, demand increased for the products of the plastic, aluminum, and specialty steel industries and the industries that supply those manufacturers. Employment in those industries benefited from the change.

Expansion or decline in industries affects growth in individual occupations because industries employ different mixes of workers (chart 7). Growth of the construction industry, for example, would lead to increases in employment of craft workers, operatives, and laborers. In contrast, growth in the finance, insurance, and real estate industries would lead to an increase in employment of professional, managerial, sales, and clerical workers.

Chart 2.
Changes in population will vary among the States.

Projected percent change in State populations, 1980 to 2000



SOURCE: Bureau of the Census

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Changes in the manner in which goods are produced and services are provided also affect occupational and industrial employment. For example, as an industry automates production, the mix of workers is likely to change, which in turn, will have different effects on occupational employment growth.

Technological change is expected to affect employment in many industries and occupations through the mid–1990's. The increasing use of automated machinery in automobile manufacturing, for example, is one of the factors expected to limit employment growth in that industry. The increasing use of word processing equipment will limit growth of employment of typists. Despite widespread technological advances, however, employment should continue to increase in most industries and occupations during the 1980's and early 1990's.

Other factors affecting employment are the fiscal policies of the Federal Government, the monetary policies of the Federal Reserve Board, the level of imports, and the availability of energy. Using information on these and other factors, the Bureau of Labor Statistics has prepared three sets of projections of employment in industries and occupations. Referred to as the low-, moderate-, and high-growth alternatives, the projections are based on different assumptions concerning growth of the labor force, unemployment, monetary and fiscal policy, and other factors. Each alternative provides a different set of estimates of employment in 1995.

The alternatives developed by the Bureau represent only three of many possible courses for the economy. Different assumptions would lead to different projections of the economy. For this reason, the alternatives should not be viewed as the bounds of employment growth; rather, the illustrate what might happen. Furthermore, Unforeseen changes in spending patterns or in technology could radically alter the projections for individual industries and occupations.

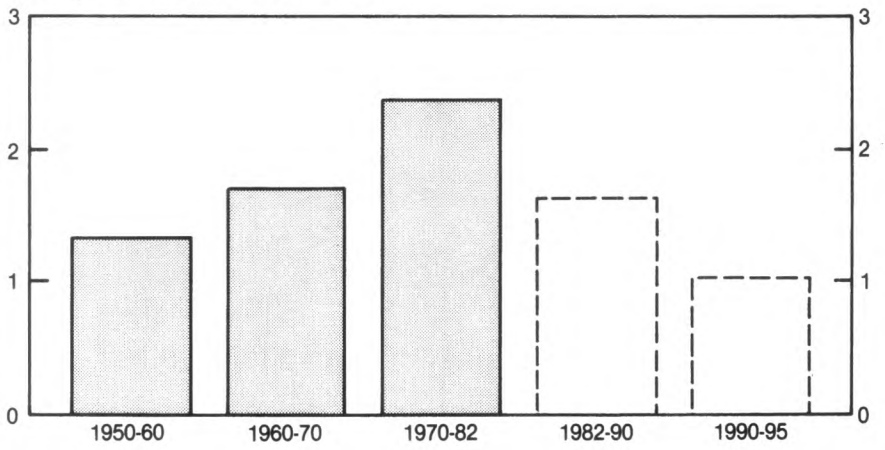
A detailed discussion of the assumptions and methods used to develop these alternative projections can be found in a separate chapter of the *Handbook*. The employment projections from the three alternatives were presented in the November 1983 issue of the *Monthly Labor Review*.

For ease of presentation, the discussions of projections and outlook information in the *Handbook* focus on the moderate-growth alternative. This alternative assumes a period of recovery from the 1981–82 recession followed by stable economic growth through the mid–1990's.

Industrial Profile

To discuss employment trends and projections in industries, it is useful to divide the economy into nine industrial sectors under two broad groups—service-producing industries and goods-producing industries. In 1982, about 7 of every 10 jobs were in industries that provide services such as health care, trade, education, repair and maintenance, government, transportation, banking, and insurance. Industries that produce goods through farming, construction, mining, and manufacturing accounted for less than three-tenths of the country's jobs.

Chart 3.
Labor force growth will slow through the mid-1990's.



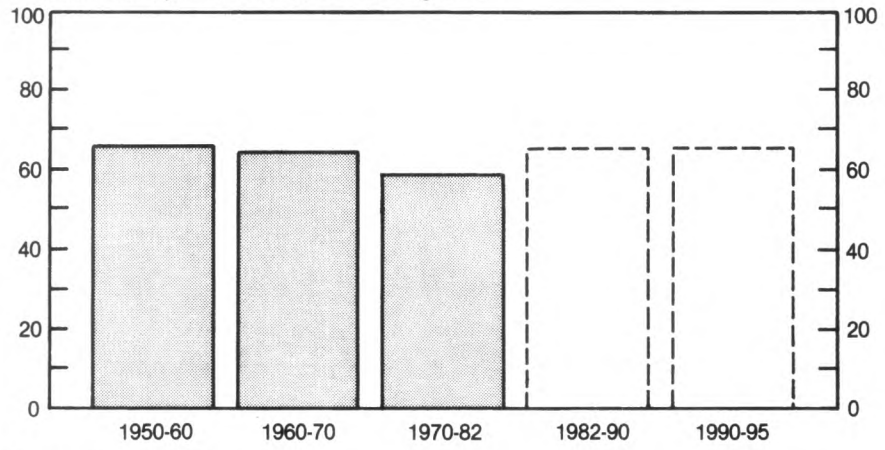
SOURCE: Bureau of Labor Statistics

Service-Producing Industries. Employment in service-producing industries has been increasing at a faster rate than employment in goods-producing industries (chart 8). Among the factors that have contributed to this rapid growth are rising incomes and living standards that result in greater demand for health care, entertainment, and business and financial services. In addition, the growth of cities and suburbs has brought a need for more local government services. Further, because many services involve personal contact, relatively fewer people have been replaced by machines in service-producing industries.

Through the mid–1990's, employment is expected to continue to increase faster in service-producing industries than in goods-producing industries. In fact, service-producing industries are projected to account for about 75 percent of all new jobs between 1982 and 1995. Employment in these industries is expected to increase from 66.5 million in 1982 to 86.2 million in 1995, or by 30 percent. Growth will vary among industries within the group (chart 9). The following paragraphs summarize recent trends and the projections of employment in the five industrial sectors that make up the service-producing industries.

Transportation, communications, and public utilities. This was the slowest growing sector of the service-producing industries during the 1970's and early 1980's. Rising employment in trucking, warehousing, and air transportation, was offset by declining employment in railroads and slow growth in other industries in the sector. Even in the communications industries, where demand increased greatly technological innovations limited employment growth.

Chart 4.
Through the mid-1990's, women will continue to account for more than half of the growth in the labor force.



SOURCE: Bureau of Labor Statistics

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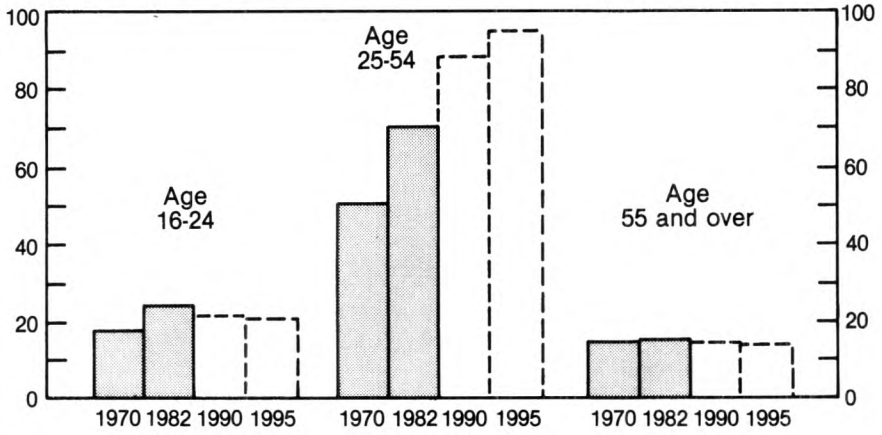
Chart 5.
Through the mid-1990's, the number of workers in the prime working ages will grow dramatically.



SOURCE: Bureau of Labor Statistics

Between 1982 and 1995, employment in transportation, communications, and public utilities is expected to rise from 5.7 million to 6.9 million, or by 21 percent. Rising demand for new telecommunications services resulting from the increased use of computer systems, and the divestiture of the telephone company will make communications the most rapidly growing industry in the sector. Employment in communications industries is projected to grow by 40 percent, from 1.4 million to 1.9 million. More efficient communication equipment, however, will keep employment from rising as rapidly as output.

Although employment in railroads and water transportation is expected to decline, it is expected to increase in other transportation industries such as air, local transit, and trucking. Employment in transportation as a whole should rise by about 12 percent, from 3.5 million to 3.9 million.

Demand for electric power, gas utilities, and water and sanitary services will increase through the mid–1990's as population and industry grow. Employment in industries that deliver these services is expected to increase from 868,000 to 1.1 million, or by 25 percent.

Trade. Both wholesale and retail trade employment have increased as the population has grown and as rising incomes have enabled people to buy a greater number and variety of goods. During the 1970's and early 1980's employment in trade increased at about the same rate as in service-producing industries as a whole. Between 1982 and 1995, wholesale and retail trade employment is expected to grow from 20.6 million to 26.8 million, or by 31 percent. Employment will increase faster in retail than in wholesale trade, 33 percent compared with 22 percent. Employment will rise despite the use of laborsaving innovations such as self-service merchandising and computerized inventory systems.

The largest number of new jobs in the trade sector is projected to be in eating and drinking places. Other retail firms expected to have large increases are department stores, grocery stores, and new car dealerships. In wholesale trade, the largest increases will be in firms wholesaling machinery, motor vehicles, and electrical goods.

Finance, insurance, and real estate. This sector grew faster than any other service-producing sector during the 1970's and early 1980's, as these industries expanded to meet the financial and banking needs of the population.

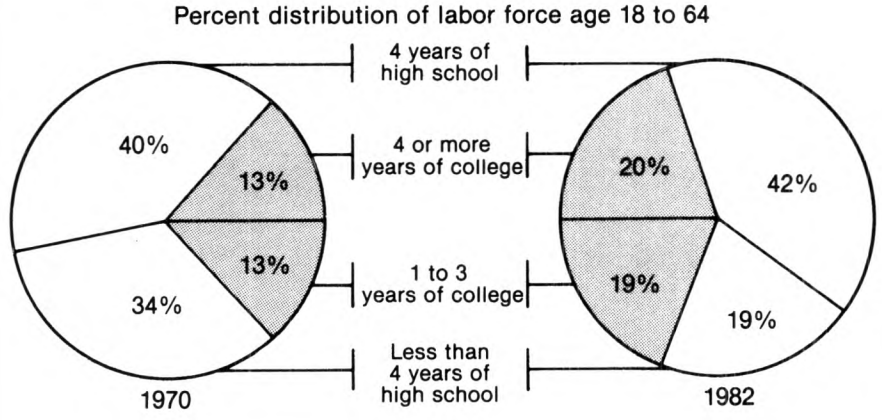
Between 1982 and 1995, employment in this sector is expected to rise from 5.4 million to 7.2 million, or by 34 percent. Demand for credit and other financial services is expected to grow rapidly, but automatic teller machines and computerized banking and stock transactions will prevent employment from growing as fast as output. However, large increases in employment are expected in banks, saving and loan associations, security brokerages, and real estate firms.

Services. This sector includes a variety of industries, such as hotels, barber shops, automobile repair shops, hospitals, engineering firms, schools, and nonprofit organizations. During the 1970's and early 1980's, employment in this sector increased faster than in service-producing industries as a whole. Sharply rising demand for health care, data processing,and engineering and legal services were among the forces behind this growth.

From 1982 to 1995, employment in service industries is expected to increase from 27.5 million to 37.2 million, or by 36 percent. These industries will provide more new jobs than any other industry sector. Business services, including data processing, personnel supply, and commercial cleaning are expected to grow more rapidly than other industries in the sector. Employment in health services also is expected to increase substantially. Efforts to control rising health costs, however, could sharply lower the employment growth in health services. Large increases in employment also are expected in engineering, legal, social, and accounting services.

Government. During the 1970's and early 1980's, increased demand for services provided by government—health and welfare services, and police and fire protection—caused employment in the government sector to rise although at a slower rate than in service-producing industries as a whole. Employment increased more in State and local governments than in the Federal Government. Between 1982 and 1995, as a result of public desire to limit government growth, employment in government is expected to rise by only 8 percent, from 7.5 million to 8.0 million.

Chart 6.
During the 1970's, the proportion of workers with a college background increased substantially.



SOURCE: Bureau of Labor Statistics

Goods-Producing Industries. Employment in these industries increased duirng the 1970's, but the 1980 and 1981–82 recessions caused a drop in construction and manufacturing employment. Between 1982 and 1995, employment in

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goods-producing industries is expected to increase from 27.1 million to 33.0 million, about 22 percent. Some of the increase reflects the rebounding of employment in manufacturing and construction to pre-recession levels. Significant variation in employment growth is expected among goods-producing industries (chart 9).

Agriculture. Employment in agriculture has declined while farm output has increased through the use of more and better machinery, fertilizers, feeds, pesticides, and hybrid plants. Domestic demand for food will increase slowly through the mid–1990's. World-wide demand for food will increase because of population growth, and U.S. food exports will increase through the next decade. Farm productivity, however, will continue to improve—although more slowly than in the past—and employment is expected to decline even as production rises. Between 1982 and 1995 agricultural employment is projected to drop from 3.2 to 3.0 million, or by 7 percent.

Mining. Employment in the mining sector increased substantially during the 1970's and early 1980's—faster than in any other sector. Nearly all of this growth occurred in coal mining and oil and gas drilling.

Through the mid–1990's, employment growth in the mining sector will slow dramatically. Between 1982 and 1995 employment is expected to grow from 1.1 million to 1.2 million, an increase of only 7 percent. The continued importance of coal as an energy source will lead to higher employment in that industry. Employment in oil and gas extraction, however, is expected to decline as domestic production levels off. Other mining industries are expected to attain their pre-recession employment levels but have little long run growth because of lower demand and improvements in mining technology.

Construction. Employment in construction dropped by 550,000 between 1979 and 1982, as high interest rates and low economic activity limited new construction, especially housing. Despite several economic slumps, employment had increased during the 1970's.

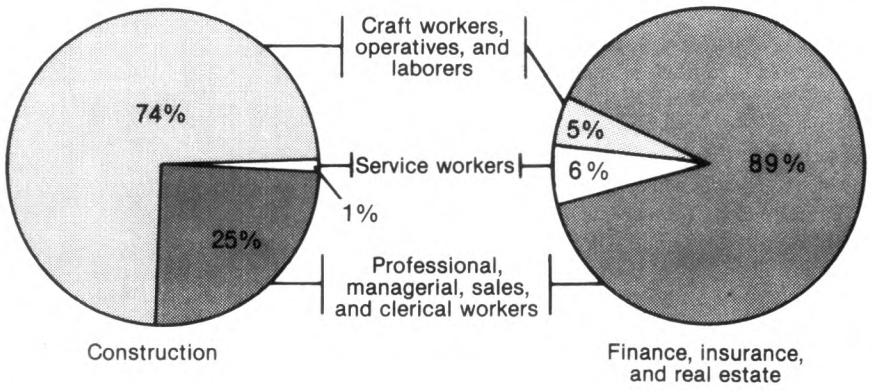
As the economic recovery continues, employment in construction is expected to rise to pre-recession levels and continue to grow. Between 1982 and 1995, employment in the construction sector is expected to increase from 3.9 to 5.8 million, or by 48 percent. Through the late 1980's, the demand for housing is expected to be strong as the number of households continues to increase. During the early 1990's, the growth in households will slow and possibly limit the demand for new housing. Business expansion and maintenance of existing buildings will lead to higher construction activity through 1995.

Manufacturing. Recession caused a 2.2 million drop in manufacturing employment between 1979 and 1982, following a slight increase during the 1970's. As the economy recovers, overall manufacturing employment is expected to increase. By 1995, employment is projected to reach 23.1 million, about 23 percent higher than the 1982 level of 18.8 million. Much of this employment growth will occur in the mid–1980's, reflecting a rebounding of employment to prerecession levels. However several key manufacturing industries, such as automobile and steel manufacturing, are not expected to reach previous peak employment levels. A turnaround in demand is expected to boost production in these industries, but foreign competition, productivity improvements, and technological change will limit employment requirements.

Manufacturing is divided into two broad categories—durable goods manufacturing and nondurable goods manufacturing. Employment in durable goods manufacturing is expected to increase by 29 percent as rising business investment and consumer demand lead to higher demand for computers, machinery, and electronic components. Employment in nondurable goods manufacturing is projected to increase more slowly, by 14 percent, reflecting the tendency of consumers to spend less of their budget on staples such as food and clothing as their income rises.

Chart 7.
Industries differ substantially in the kinds of workers they employ.

Percent distribution of wage and salary workers, 1982



SOURCE: Bureau of Labor Statistics

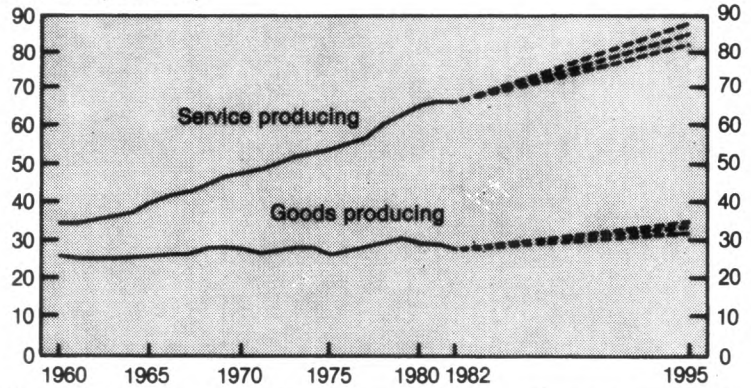
Occupational Profile

This section gives an overview of the changes expected in employment for 16 broad groups of occupations. These groups are based on the Standard Occupational Classification, which has been adopted as the classification system for all government agencies that collect occupational employment data.

In the following discussion, as throughout the *Handbook,* the employment growth rates of individual occupations usually are compared to the national average for all occupations. Half a dozen phrases are used to describe the employment growth; they are explained in the box on page

Chart 8.
Industries providing services will continue to employ an increasing proportion of the work force.

Workers (millions)[1]



[1]Wage and salary workers, except for agriculture, which includes self-employed and unpaid family workers

NOTE: Dashed lines represent low, moderate, and high projections
SOURCE: Bureau of Labor Statistics

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It is important to remember that employment growth will vary among the occupations within each of the 16 broad groups, and that both the rate of growth and the size of the change in employment are important in analyzing the job outlook (chart 10).

Administrative and managerial occupations. Workers in these occupations direct and control the activities of businesses, government agencies, and other organizations, or provide technical support to workers who do. In most of these occupations, employment is expected to increase about as fast as the average for all occupations. Although managers and administrators are employed throughout the economy, differences in industry growth will result in differences in the rates of employment growth for managers and administrators. Employment of managers in the health industry, for example, is expected to increase much faster than the average. Employment of managers also should grow as fast as or faster than the average in electronic components manufacturing, data processing services, credit and securities firms, automotive repairs, and social services. In contrast, managerial employment in government and educational services is likely to grow more slowly than the average due to the anticipated modest growth of these industries.

Because of the increasing number of people seeking managerial and administrative jobs and the increasing technical requirements in many of these occupations, experience, specialized training, or post-baccalaureate study will be needed for many managerial jobs. Familiarity with computers also will be helpful as managers and administrators increasingly rely on computerized information systems to direct their organizations.

Engineers, scientists, and related occupations. Workers in these occupations design buildings, machinery, products, and systems; conduct research; and perform related activities. Employment in many of the occupations in this group is expected to increase faster than the average; in several—electronic engineers, mechanical engineers, and systems analysts—it will increase much faster than the average.

Increased military expenditures, growing demand for computers and other electronic equipment, expansion and automation of industrial production, and development of energy sources are some of the factors expected to lead to higher employment in engineering occupations. The growing application of computers in business and research will contribute to increased employment of systems analysts. Research to expand basic knowledge, develop new technologies and products, and protect the environment is expected to lead to higher employment in many scientific and engineering occupations. However, if the rate of economic growth and the research and development levels differ from those assumed, the job outlook in many of these occupations would be altered. Competition in some smaller occupations that are dependent on Government funding, such as astronomers, will continue to be keen.

Social science, social service, and related occupations. In these occupations, workers provide direct social services and conduct applied research into the behavior of individuals, groups, and society at large. Employment in many of the occupations in the group is expected to grow about as fast as the average. However, due to the number of people interested in these fields, competition for jobs is expected in many social science occupations—especially for academic positions. Generally, prospects will be better for social scientists with advanced degrees who seek work in applied fields.

Competition also is likely for jobs as social and recreation workers in public and voluntary agencies as well as for salaried positions for lawyers.

Teachers, librarians, and counselors. Workers in these occupations help people learn, acquire information, or gain insight into themselves. Because of anticipated enrollment declines and an abundance of qualified jobseekers, competition is expected for jobs in college and university teaching, as librarians, in counseling, and, through 1990, in secondary school teaching. Staff cutbacks in school systems and social service agencies will intensify competition for these jobs.

As school enrollments start increasing after 1985, job prospects for elementary school teachers are expected to be more favorable than in recent years. Prospects in secondary schools may improve in the early 1990's, as enrollments there begin to increase. Teachers and librarians generally will face better job prospects in scientific and technical fields.

Health-related occupations. This group includes health practitioners, nurses, health technicians and technologists, health service workers, dietitians, pharmacists, and therapists. Workers in these occupations care for the sick, help the disabled, and advise individuals and communities on ways of maintaining and improving their health.

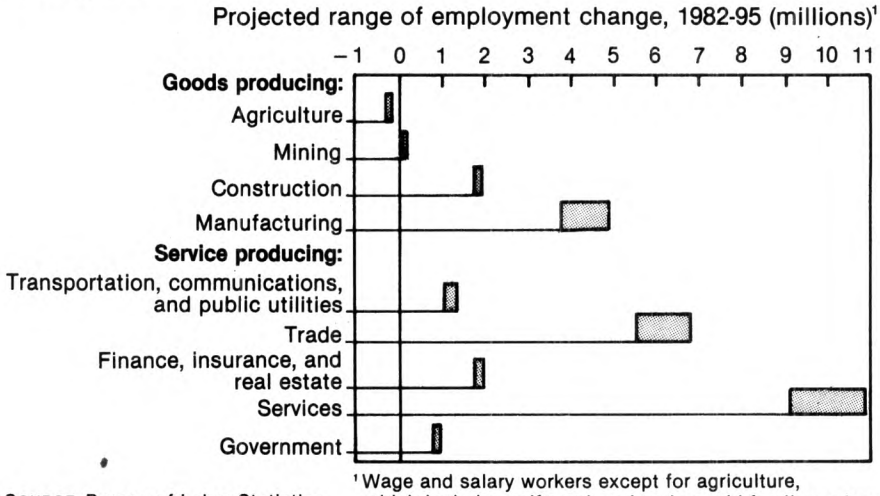
Employment in most of the health occupations is expected to grow faster than average as population growth—especially in the number of older people—increases the demand for health care. Registered nurses, nursing aides and orderlies, because of the large size and anticipated growth in these occupations, will be among the occupations providing the most new jobs through the mid–1990's. Despite the anticipated growth in the health industry, physicians, dentists, chiropractors, and veterinarians seeking to establish practices can expect unprecedented competition due to the large number of newly trained practitioners each year.

It should be noted that the projections are based on the assumption that health care expenditures will continue to increase rapidly and that health financing will not undergo drastic change. However, current efforts to control health costs could result in substantial changes in the reimbursement procedures and, thereby, directly affect the economic incentives of suppliers of health care. Such changes would be likely to lower the projected employment levels in many health occupations. In some, such as health record technicians, new procedures could lead to more growth than currently projected.

Writers, artists, and entertainers. This group includes reporters, writers, designers, public relations specialists, and performing artists. In most of these occupations, employment is expected to increase as fast as the average for all occupations. The continued importance of advertising, public relations, print and broadcast communications, and entertainment will spur employment growth.

Stiff competition for jobs in these occupations is likely, due to the large numbers of people they attract. Talent and personal drive will continue to play an extremely important role in succeeding in these occupations. Within individual occupations, some areas will offer better job prospects. The best prospects for writers and editors, for example, will be in technical writing and in preparing business and trade publications.

Chart 9.
Through the mid-1990's, changes in employment will vary widely among industries.



SOURCE: Bureau of Labor Statistics

[1] Wage and salary workers except for agriculture, which includes self-employed and unpaid family workers.

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Technologists and technicians. Workers in this group provide technical assistance to engineers, and scientists, and other professional workers as well as operate and program technical equipment independently. The continued growth in the importance of technology to national defense, office work, manufacturing, and other activities is expected to cause much faster than average employment growth for several occupations in this group, such as legal assistants, programmers, and electrical and electronic technicians.

Employment growth in some of the occupations will be limited by changes in technology. Little or no change in the employment of drafters is expected because of the increasing use of computer-aided design equipment. Similarly, little or no change in the employment of air traffic controllers is expected due to the automation of air traffic control equipment.

Marketing and sales occupations. Workers in this group sell goods and services. Employment of travel agents, security sales workers, real estate agents, and wholesale trade sales workers is expected to grow faster than the average due to the anticipated growth of industries in which these workers are employed.

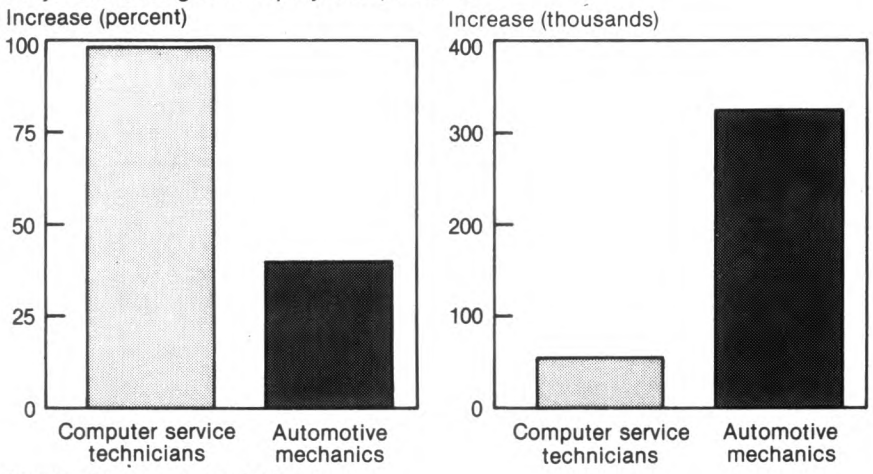
A large number of part-time and full-time openings are expected for cashiers and retail trade sales workers due to the large size, high turnover, and expected employment growth in these occupations. Higher paying sales occupations, such as insurance agent and real estate agent, tend to be more competitive than retail sales occupations. Well-trained and ambitious people who enjoy selling will have the best chance for economic success.

Administrative support occupations, including clerical. Workers in this group prepare and record letters and other documents; collect accounts; gather and distribute information; operate office machines; and handle other tasks that help run businesses, government agencies, and other organizations. Some administrative support occupations will enjoy much faster than average employment growth. Employment of computer operators and peripheral equipment operators, for example, is expected to grow much faster than the average due to the increased use of computer systems.

The increase in office automation systems, on the other hand, will limit employment opportunities in some administrative support occupations. Changes in organizational practices also will affect employment for some of these occupations. Despite a growing volume of mail, little change is expected in the employment of mail carriers because of improved routing programs and more centralized mail delivery. Several occupations in this group will provide many full- and part-time job openings due to their large size and high turnover. These include bank tellers, bookkeepers and accounting clerks, secretaries, shipping and receiving clerks, and typists.

Service occupations. This group includes a wide range of workers in protective, food and beverage preparation, cleaning, and personal services. Among the protective service occupations, guards are expected to have faster than average growth because of increased concern over crime and vandalism. However, the anticipated slow growth of local government spending is expected to result in slower than average employment growth for police officers and firefighters.

Chart 10.
When assessing future job opportunities, both the rate of growth and the number of new jobs need to be considered.
Projected change in employment, 1982-95



SOURCE: Bureau of Labor Statistics

Rising incomes, increased leisure, and the growing number of men and women who combine family responsibilities and a job are expected to contribute to faster than average employment growth among food and beverage preparation and service occupations. Due to the large size, high turnover, and growth of many food service occupations, such as bartenders and waiters/waitresses, full- and part-time job openings will be plentiful.

Agricultural and forestry occupations. Workers in these occupations produce raw materials necessary to meet the country's needs for food, clothing, and shelter. Demand for food, fiber, and wood is expected to increase as the world population grows. The development and use of more productive farming and forestry methods, however, is expected to result in declining employment in most agricultural and forestry occupations.

Mechanics and repairers. These workers adjust, maintain, and repair automobiles, industrial equipment, computers, and many other types of machinery. Employment in most of these occupations is expected to grow about as fast as the average due to the continued importance of machines in industries and homes. In some, employment will increase faster than the average. The increased use of computers and advanced office machinery, for example, will make employment of computer service technicians and office machine repairers grow much faster than the average. For some mechanic and repairer occupations, such as communication equipment mechanics, improvements to machinery will lower maintenance requirements and limit employment growth.

Construction occupations. Workers in this group construct, alter, and maintain buildings and other structures. Employment in most of these occupations is expected to grow faster than the average. Some of this growth, however, reflects a rebounding of employment to levels that existed before the 1980 and 1981–82 recessions. Increases in the population and the number of households and a rise in spending for new industrial plants are factors expected to lead to more new construction. Alteration and modernization of existing structures, as well as the need for maintenance and repair on highway systems, dams, and bridges also will contribute to increased construction activity.

Continued technological developments in construction methods, tools and equipment, and materials will limit employment growth by raising the productivity of workers. One important development, for example, is the continued growth in the use of prefabricated materials. The use of these materials limits the number of workers needed at the construction site.

Since the construction industry is sensitive to changes in the Nation's economy, employment in construction occupations may fluctuate from year to year. Construction workers can expect to experience periods of unemployment during downturns in the economy which usually result in reduced construction activity.

Production occupations. Workers in these occupations perform tasks involved in the production of goods. They set up, adjust, operate, and tend machinery and equipment, and use handtools and hand-held power tools to fabricate and assemble products.

The recovery of the manufacturing industry from the 1981–82 recession and the growth projected for this sector through the mid–1990's will result in average employment growth in many production occupations. For some, such as patternmakers and job-and-die setters, most of the employment growth reflects a rebounding of employment to pre-recession levels. Changes in production techniques and the increased used of automated machinery, such as

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robots, will prevent employment in some production occupations from rising as rapidly as the output of goods.

Many production occupations are sensitive to fluctations in the business cycle. Just as employment opportunities increases when the economy is healthy, when factory orders decline during economic downturns, workers may experience shortened workweeks, layoffs, and plant closings.

Transportation occupations. Workers in this group operate the equipment used to move people and materials. Increasing economic activity will increase the need for transport services. This increase in demand is expected to result in average employment growth for truckdrivers and airplane pilots. Increased use of automated material handling systems, however, is expected to cause slower than average growth of employment of industrial truck operators.

Handlers, equipment cleaners, helpers, and laborers. Workers in this group assist skilled workers and perform the routine unskilled tasks required to complete a project. Jobs in these occupations generally are expected to be plentiful due to the high turnover rate. However, economic downturns can lower the number of openings substantially. This is particularly true for construction laborers and other workers in industries that are sensitive to changes in the Nation's economy. Over the long run, as routine tasks are mechanized, employment in these occupations is expected to grow more slowly than the average.

Since the employment prospects in individual occupations will differ within each of the 16 groups, it is important to check the outlook for each occupation that interests you. While the *Handbook* contains information for only 190 or so occupations, current and projected employment estimates for many more occupations—nearly 700 in all—are presented in the 1984 edition of *Occupational Projections and Training Data, 1984 Edition,* BLS Bulletin 2206, a companion volume to the *Handbook*.

Replacement Needs

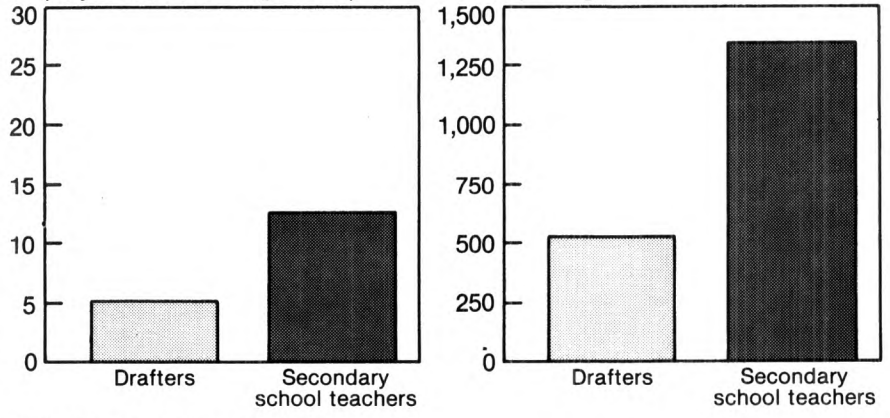
Most discussions of future job opportunities focus on the employment growth in industries and occupations. Since the faster growing industries and occupations generally offer better opportunities for employment and advancement than slow growing ones, employment growth is a good gauge of job outlook. Another element in the employment outlook, however, is replacement needs. Replacement openings occur as people leave occupations. Some transfer to other occupations as a step up the career ladder or to change careers. Some temporarily stop working, perhaps to return to school or care for a family. And some leave the labor force permanently—retirees, for example. These movements result in job openings.

Through the mid–1990's, most jobs will become available as the result of replacement needs. Among occupations, however, the number of replacement jobs and the proportion of total job openings made up by replacement needs will vary significantly. Factors that determine the number of replacement jobs in an occupation include its size, the earnings and status associated with the occupation, the length of training required, the average age of workers, and the proportion of part-time workers. Occupations with the most replacement openings generally are large, with low pay and status, low training requirements, and a high proportion of young and part-time workers. Occupations with high replacement needs include: File clerks, cashiers, construction laborers, and stock handlers. Workers in these occupations who lose their job or leave voluntarily often are able to find a similar job. They also have not spent much money or time in training for their jobs, so there is limited incentive to stay in such occupations. Occupations with low training requirements often attract workers with limited attachment to the labor force, such as young people working part time.

The occupations with relatively few replacement openings, on the other hand, are ones with high pay and status, lengthy training requirements, and a high proportion prime-working age full-time workers. Among these occupations are architects, dentists, and dental laboratory technicians. Workers in these occupations generally have spent several years acquiring training that often is not applicable to other occupations. These workers enjoy good pay and high status, but would find it difficult to change to other high-paying occupations without extensive retraining.

When considering replacement needs, it is important to note, first, that occupations with little or no employment growth or slower than average growth can still offer many job openings (chart 11). Second, in many occupations with a large number of replacement openings, the pay and status are low. Many of the available jobs are only part-time positions. These occupations, therefore, may not be suitable for a person planning a long-term career, despite the large number of openings. More information about replacement needs is available in *Occupational Projections and Training Data*.

Chart 11.
Because of replacement needs, even occupations that are growing slowly can have many job openings.



SOURCE: Bureau of Labor Statistics

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Assumptions and Methods Used in Preparing Employment Projections

The discussions of future employment contained in the *Handbook* are written in qualitative terms but are based on quantitative estimates developed using the most recent data available on population, industry and occupational employment, productivity, consumer expenditures, and other factors expected to affect employment. The Bureau's staff specializing in developing economic and employment projections provided much of these data, but many other agencies of the Federal Government were important contributors as well.

In addition, experts from industry, unions, professional societies, and trade associations furnished data and supplied information through interviews. Many of these individuals also reviewed preliminary drafts of the statements. Each statement thus reflects the knowledge and judgment not only of the Bureau of Labor Statistics staff, but also of leaders in the fields discussed. The Bureau, of course, takes full responsibility for the published material.

Information compiled from these sources was analyzed in conjunction with projections of the economy to 1995 constructed as part of the Bureau's projections program. Like other models used in projecting economic and employment growth, the Bureau's system encompasses the major facets of the economy and represents a comprehensive view of its projected structure. It is comprised of a series of closely related projections of the labor force, gross national product (GNP), industrial output and productivity, average weekly hours of work, and employment for detailed industries and occupations. The model system is essentially the same as the one used to develop the 1990 projections. A detailed description of the model system appears in *The BLS Economic Growth Model System Used for Projections to 1990,* Bulletin 2112.

Assumptions. The Bureau has prepared three different scenarios of economic growth through 1995. Each alternative is based on the following general assumptions.

—The institutional framework of the U.S. economy will not change radically, and current social, technological, and scientific trends will continue.

—No major event such as war or widespread or long-lasting energy shortages will significantly alter the industrial structure of the economy or the rate of economic growth.

—Federal expednitures will decline as a proportion of GNP. Federal grants-in-aid to State and local governments will decline.

The differences among the scenarios reflect different sets of specific assumptions about fiscal and monetary policy. These result in higher or lower levels of GNP and its components, such as investment and personal consumption expenditures. While these alternative projections give some idea of how employment could vary under different assumptions, actual growth could be outside the range of the alternatives. Furthermore, unforeseen changes in spending patterns—for example, in defense budgets or in consumer preferences—could greatly alter the growth of individual occupations. Unanticipated changes in technology which affect the way goods and services are produced could also alter growth. Detailed information about the assumptions used in these projections is presented in the November 1983 issue of the *Monthly Labor Review.*

Methods. Beginning with population projections by age and sex and race developed by the Bureau of the Census, a projection of the total labor force is derived using expected labor force participation rates for each population group. In developing participation rates, the Bureau takes into account a variety of factors that affect decisions to enter the labor force, such as school attendance, retirement practices, and family responsibilities.

The projection of the GNP level and the distribution of GNP by its major components (consumer expenditures, investment, government, and net exports) is carried out using a detailed macroeconomic model of the U.S. economy. Based on the projected labor force and on the various fiscal and monetary policy assumptions mentioned previously, a consistent distribution of real GNP by its major components and associated estimates of employment, output per workhour, and hours paid by major producing sectors are arrived at. The use of a macroeconomic model at this stage of the projections ensures a balanced and internally consistent representation of U.S. economic conditions over the projection horizon. Each of the major GNP components is in turn broken down by producing industry. Consumer expenditures, for example, are divided among industries producing goods and services such as housing, food, automobiles, medical care, and education.

Once estimates are developed for these products and services, they are translated into detailed projections of industry output, not only for the industries producing the final product—such as an automobile—but also for the industries that provide electric power, transportation, component parts, and other inputs required in the production process. Input-output tables developed by the Department of Commerce and modified by BLS are used to estimate output.

By using estimates of future output per workhour based on studies of productivity and technological trends for each industry, industry employment projections are derived from the output estimates. In addition, many detailed industries are studied using regression analysis. In these studies, equations are developed that relate employment by industry to combinations of economic variables, such as population and income, that are considered determinants of long-run changes in employment. The industry employment projections developed through these studies are evaluated with data generated by the basic model to develop the final industry employment projections. They also are used to develop projections for industries that are not included in the basic model.

Occupational employment projections. Projections of industry employment are translated into occupational employment projections using an industry-occupation matrix. The major source of occupational staffing patterns is the Bureau's Occupational Employment Statistics (OES) survey. The OES survey collects data from employers on the occupational distribution of workers in all nonagricultural industries, except private households. Each industry is surveyed every 3 years.

The occupational distribution of wage and salary workers in agriculture and private households, not covered by the OES survey, is derived from the Current Population Survey (CPS). Data on self-employed and unpaid family workers in each occupation also come from the CPS. Data from the matrix are available for over 200 industries and over 600 occupations.

Staffing patterns that reflect data from the OES surveys are projected to the target year (1995) and, when applied to projections of total employment by industry and summed across all industries, yield employment projections for all occupations in the matrix. Thus, projected employment in an occupation is determined by changes in the proportion of workers in the occupation in each industry, and the growth rates of industries in which the occupation is concentrated. For example, employment in an occupation would be projected to grow: (1) If its proportion of the work force increases but industry employment remains constant, or (2) if its proportion of the work force remains constant but industry employment increases.

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In some cases, employment is projected on the basis of its relationship to certain independent variables rather than on its representation in each industry. This approach is particularly useful when projecting employment for an occupation that is affected by a unique set of factors. For example, employment of elementary school teachers is projected based on trends in pupil-teacher ratios applied to projected school attendance, and the projection of automobile mechanics is based on the expected stock of motor vehicles. Projections that are developed independently are compared with those in the matrix and revised, if necessary, to assure consistency.

Replacement needs. In addition to projections of employment, estimates are made of the total number of job openings expected to occur in many occupations. Growth in the size of an occupation is only one source of job openings. Employment opportunities also occur when workers transfer to another occupation, leave the labor force temporarily, retire, or die. Using longitudinal data derived from the Current Population Survey, estimates of replacement needs from all sources have been developed that provide a comprehensive view of the demand for workers in various occupations.

Detailed information on replacement needs for many of the occupations covered in the 1984–85 edition of the *Handbook* will be presented in *Occupational Projections and Training Data, 1984 Edition,* BLS Bulletin 2206.

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Administrative and Managerial Occupations

Managers and administrators achieve the objectives of their organization by planning and directing the activities of others. In a very small enterprise, the owner may also be the manager. However, as a business or other organization grows and becomes more complex, more people are needed to oversee the operations of the work force. Large corporations or government agencies may employ hundreds of managers, organized into a hierarchy of administrative positions.

Top level managers—executives—are primarily concerned with policymaking, planning, staffing, and overall coordination. They direct the activities of the organization through departmental or "middle" level managers. Top level managers include school superintendents, police and fire chiefs, bank presidents, governors, mayors, hospital administrators, chief executive officers of corporations, department store managers, and government agency directors.

Below the top management in a large organization are the middle managers, who direct various departments. Middle managers may handle a particular area, such as personnel, accounting, sales, finance, or marketing. Or they may supervise the production process at a factory or industrial plant. Middle managers are the people who keep things running smoothly. They organize activities at the operating level and provide direct supervision.

Middle managers work with the assistance of administrative support personnel who plan, organize, analyze, and monitor activities. Support personnel include accountants, loan officers, underwriters, employment interviewers, purchasing agents and buyers, credit managers, membership directors, business and promotion agents, and inspectors of all kinds. Jobs such as these require technical expertise or a thorough understanding of a particular procedure or operation.

Managers and administrators are employed in virtually every type of industrial plant, commercial enterprise, and government agency. Large numbers are employed in finance, insurance, real estate, construction, government, health, education, transportation, public utilities, and business services.

Because of the wide range of establishments employing managers, job duties vary greatly. For example, the manager of a fast-food restaurant performs tasks that differ substantially from those of a school administrator, community organization director, or construction manager.

Since maturity and knowledge are essential, entrants to administrative and managerial occupations are generally older and have more education and work experience than entrants to most other occupations. Because the nature of the work varies, however, so does the level of education required. Some managers and administrators, including school principals and hospital administrators, need at least a master's degree. Positions such as these require the specialized knowledge and skills obtained through years of formal education. Other positions, including production supervisor, retail buyer, construction manager, and maintenance superintendent, may not require a college degree. People in these jobs often have worked their way up in the organization. Their main qualification is a thorough knowledge of the operating procedures of the workplace. In some fields— such as accounting and bank management—continuing education can accelerate career advancement.

On-the-job training enables workers with management potential to "learn the ropes." Particularly in wholesale and retail trade, many managers begin as management trainees, working under the direction of more experienced managers. Management trainees may be hired from outside the organization or promoted from other positions within it. On-the-job training programs provide trainees with the specific knowledge and experience they need to perform successfully.

Despite the differences in formal education and training, successful managers are likely to have certain characteristics in common. Because they work with people, managers need to be able to get along with and motivate and influence others. They should be able to inspire confidence and respect in those who work for them.

When they make plans and set goals for their enterprise, managers work with ideas. They need organizational skills, good judgment, and decisionmaking ability. Successful managers have mastered the art of getting all the facts, coming to a decision, and communicating it effectively. They need a strong sense of initiative to be able to work without close supervision.

For some administrative positions, analytical, evaluative, and promotional skills are essential. Accountants, purchasing agents, and others provide the technical expertise upon which management decisions are based. Like managers, they work closely with other people, but usually in a support rather than a supervisory capacity. Decisionmaking ability, good judgment, and the ability to relate to others are important for people in these occupations.

Earnings for managers and administrators vary widely. They depend on the industry and on the size and nature of the particular establishment in which the manager is employed. For example, restaurant managers earn considerably less, on the average, than sales managers outside retail trade. Earnings also vary with the level of managerial or administrative responsibility. For example, management trainees may start working at salaries that are not much higher than those of the people they supervise. Earnings increase as managers gain experience, prove their ability to handle the job, and take on additional responsibility. Median annual earnings of full-time administrators and managers, excluding self-employed, were about $22,000 in 1982. The middle 50 percent earned between $16,000 and $32,000. The top 10 percent earned about $40,000 or more.

On the whole, employment of managers and administrators is projected to grow about as fast as the average for all occupations through the mid-1990's. The overwhelming majority of job openings is expected to result from the need to replace those who transfer to other fields, retire, or leave the occupation for other reasons.

The number of new jobs for managers and administrators created as a result of employment expansion will vary by industry sector. Government and educational services, for example, will experience slower-than-average growth—resulting in limited demand for additional administrators and support personnel. Also, the large number of self-employed managers and administrators is expected to decline somewhat, as large enterprises and chain operations increasingly dominate business activity.

Projected above-average expansion in the health services industry will generate many new managerial and administrative support positions in hospitals, clinics, nursing homes, and other health-related organizations. Employment growth should also be strong among firms involved in electronic components manufacturing, computer and data processing services, credit and securities firms, food services, automotive repairs, automobile rental services, and social services.

More detailed information on a number of administrative and managerial occupations appears in the following statements.

Accountants and Auditors

(D.O.T. 160 through .167-042, and .267-014; and 189.117-038)

Nature of the Work

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

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Four major fields are public, management, and government accounting and internal auditing. Public accountants have their own businesses or work for accounting firms. Management accountants, also called industrial or private accountants, handle the financial records of their company. Internal auditors verify the accuracy of their firm's financial records and check for waste or fraud. Government accountants and auditors examine the records of government agencies and audit private businesses and individuals whose dealings are subject to government regulations.

Accountants often concentrate on one phase of accounting. For example, many public accountants are employed primarily in auditing (examining a client's financial records and reports and attesting that they are in comformity with standards of preparation and reporting). Others concentrate on tax matters, such as preparing income tax forms and advising clients of the tax advantages and disadvantages of certain business decisions. Still others concentrate on management consulting and offer advice on a variety of matters. They might develop or revise an accounting system to serve the needs of clients more effectively or give advice about various types of computers or electronic data processing systems.

Management accountants provide the financial information executives need to make sound business decisions. They may work in areas such as taxation, budgeting, costs, or investments.

Internal auditing is rapidly growing in importance as top management must increasingly base its decisions on reports and records rather than personal observation. Internal auditors examine and evaluate their firm's financial systems and management procedures to ensure that accounting records are accurate and financial controls are adequate to protect against fraud. They also review company operations, evaluating their efficiency, effectiveness, and compliance with laws and government regulations.

Many persons with accounting backgrounds work for the Federal Government as Internal Revenue Service agents or in financial management, financial institution examination, and budget administration. Others staff the faculties of business and professional schools as accounting teachers, researchers, or administrators. Some accountants teach part time, work as consultants, or serve on committees of professional organizations.

Working Conditions

Most accountants and auditors work in offices and have regular hours. Self-employed accountants, who may set up offices at home, work as many hours as the business requires.

Tax accountants work long hours under heavy pressure during the tax season. Accountants employed by large firms may travel extensively to audit or work for clients or branches of the firm.

Employment

Accountants and auditors held about 856,000 jobs in 1982; more than 200,000 were Certified Public Accountants (CPA), 20,000 were licensed public accountants (primarily self-employed tax specialists), about 12,000 were Certified Internal Auditors (CIA), and about 4,000 were Certified Management Accountants (CMA). About 10 percent of all accountants were self-employed. Less than 10 percent worked part time.

Most accountants do management accounting. Many others are engaged in public accounting as proprietors, partners, or employees of independent accounting firms. Other accountants work for Federal, State, and local government agencies.

Accountants and auditors are found in all business, industrial, and government organizations. 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

Most public accounting and business firms require applicants for accountant and internal auditor positions 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. A growing number of employers prefer applicants who are familiar with computers and their applications in accounting and internal auditing. For beginning accounting and auditing positions, the Federal Government requires 4 years of college (including 24 semester hours in accounting or auditing) or an equivalent combination of education and experience. However, applicants face competition for the limited number of openings in the Federal Government.

Previous experience in accounting or auditing can help an applicant get a job. Many colleges offer students an opportunity to gain experience through summer or part-time internship programs conducted by public accounting or business firms. Such training is invaluable in gaining permanent employment in the field.

Professional recognition through certification or licensure also is extremely valuable. Anyone working as a "certified public accountant" must have a certificate and a license issued by a State board of accountancy. All States use the four-part Uniform CPA Examination, prepared by the American Institute of Certified Public Accountants, to establish certification. The CPA examination is rigorous and candidates are not required to pass all four parts at once. However, most States require candidates to pass at least two parts for partial credit. Many States require all sections of the test to be passed within a certain period of time. Although the vast majority of States require CPA candidates to be college graduates, some States substitute a certain number of years of public accounting experience for the educational requirement. Most States require applicants to have some public accounting experience for a CPA certificate. For example, bachelor's degree holders most often need 2 years of experience while master's degree holders often need no more than 1 year. Based on recommendations made by the American Institute of Certified Public Accountants, a few States require or are considering requiring CPA candidates to have training beyond a bachelor's degree and, in some cases, a master's degree. This requirement is expected to become more common in the coming years.

For license or registration as a "public accountant" or "accounting practitioner," some States require only a high school diploma while others require college training. Information on requirements may be obtained directly from individual State boards of accountancy or from the National Society of Public Accountants (NSPA).

The Accreditation Council for Accountancy awards accreditation in accountancy and taxation to persons who have passed a comprehensive examination. Accreditation is maintained by completing mandatory continuing education. The Institute of Internal Auditors, Inc., confers the Certified Internal Auditor (CIA) upon graduates from accredited colleges and universities who have completed 2 years' experience in internal auditing and who have passed a four-part examination. The National Association of Accountants (NAA) confers the Certificate in Management Accounting (CMA) upon candidates who pass a series of uniform examinations and meet specific educational and professional standards.

Persons planning a career in accounting should have an aptitude for mathematics, be able to analyze, compare, and interpret facts and figures quickly, and to make sound judgments based on this knowledge. They must question how and why things are done and be able to clearly communicate the results of their work, orally and in writing, to clients and management.

Accountants and auditors must be patient and able to concentrate for long periods of time. They must be good at working with systems and computers as well as with people. Accuracy and the ability to handle responsibility with limited supervision are important.

Perhaps most important, because millions of financial statement users rely on their services,

Accountants and auditors develop, analyze, and interpret financial information.

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accountants and auditors should have high standards of integrity.

A growing number of States require both CPA's and licensed public accountants to complete a certain number of hours of continuing education before licenses can be renewed. The professional associations representing accountants sponsor numerous courses, seminars, group study programs, and other forms of continuing education. Increasingly, accountants and auditors are studying computer programming so they can adapt accounting procedures to data processing. Although capable accountants and auditors should advance rapidly, those having inadequate academic preparation may be assigned routine jobs and find promotion difficult.

Many graduates of junior colleges and business and correspondence schools, as well as outstanding bookkeepers and accounting clerks who meet the education and experience requirements set by their employers, are successful in landing junior accounting positions.

Junior public accountants usually start by assisting with auditing work for several clients. They may advance to intermediate positions with more responsibility in 1 or 2 years and to senior positions within another few years. 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 chief plant accountant, chief cost accountant, budget director, or manager of internal auditing. Some become controllers, treasurers, financial vice-presidents, or corporation presidents. Many corporation executives have backgrounds in accounting, internal auditing, and finance.

Job Outlook

Employment of accountants and auditors is expected to grow faster than the average for all occupations through the mid-1990's due to the key role these workers play in the management of all types of businesses. Although employment growth will generate many new jobs, most openings will result from the need to replace workers who leave the occupation, retire, or die. While accountants and auditors tend to leave the profession at a lower rate than members of most other occupations, replacement needs will be substantial because the occupation is large.

Financial information developed by accountants and verified by auditors is vital to business decisionmaking. For example, plant expansion, mergers, or foreign investments may depend upon the financial condition of the firm, tax implications of the proposed action, and other considerations. As businesses grow, the volume and complexity of information on budgets, expenditures, and taxes grow as well, increasing requirements for accountants and auditors. Small businesses are expected to rely more and more on the expertise of public accountants in planning their operations. In addition, increases in investment and lending also should spur demand for accountants and auditors.

Opportunities are expected to be favorable for college graduates seeking accounting and auditing jobs. Certified accountants, such as CPA's, should have a wider range of job opportunities than other accountants. However, competition for jobs with prestigious accounting firms will remain keen. Opportunities for accountants without a college degree will occur mainly in small businesses and accounting firms.

The increasing use of computers and electronic data processing systems in accounting and auditing should stimulate the demand for accountants familiar with their operation. Opportunities should be particularly good for internal auditors and tax accountants.

Many employers prefer graduates who have worked part time in a business or accounting firm while in school. In fact, experience has become so important that some employers in business and industry seek persons with 1 or 2 years' experience for beginning positions.

Accountants rarely lose their jobs when other workers are laid off during hard economic times. Financial information must be developed and tax reports prepared regardless of the state of the economy.

Earnings

According to a 1982 College Placement Council Salary Survey, bachelor's degree candidates in accounting received offers averaging around $18,400 a year; master's degree candidates, $21,600.

The starting salary of accountants in private industry was about $19,500 a year in 1983, according to a national survey. Earnings of experienced accountants ranged between $23,300 and $51,800, depending on their level of responsibility and the complexity of the accounting system. Chief accountants who direct the accounting program of a company or one of its establishments earned between $33,700 and $67,900, depending upon the scope of their authority and size of professional staff.

According to the same survey, beginning auditors averaged $18,700 a year in 1983, while experienced auditors' earnings ranged between $23,300 and $34,100. Beginning public accountants employed by public accounting firms averaged $18,700 a year, while earnings of experienced public accountants ranged from $20,600 to $29,100.

In the Federal Government, the starting annual salary for junior accountants and auditors was about $13,000 in early 1982. Candidates who had a superior academic record could begin at $16,100. Applicants with a master's degree or 2 years' professional experience began at $19,700. Accountants and auditors in the Federal Government averaged about $30,500 a year in 1982.

Related Occupations

Accountants and auditors design and control financial records and analyze financial data. Others for whom training in accounting is invaluable include appraisers, budget officers, loan officers, financial analysts, bank officers, actuaries, underwriters, tax collectors and revenue agents, FBI special agents, securities sales workers, and purchasing agents.

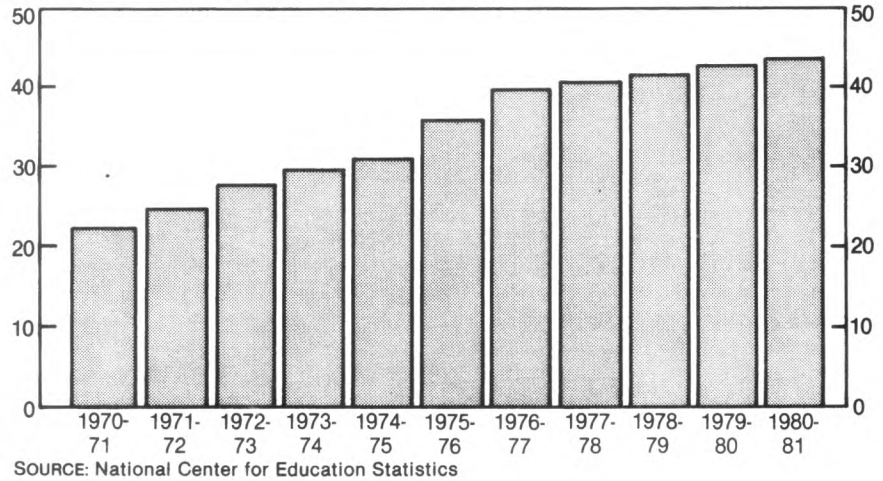
Sources of Additional Information

Information about careers in accounting and about competency tests administered in high schools, colleges, and public accounting firms may be obtained from:

American Institute of Certified Public Accountants, 1211 Avenue of the Americas, New York, N.Y. 10036.

Information on specialized fields of accounting and auditing is available from:

The number of accounting graduates grew very rapidly during the 1970's in response to a strong demand for accountants and auditors.



SOURCE: National Center for Education Statistics

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

National Society of Public Accountants and Accreditation Council for Accountancy, 1010 North Fairfax St., Alexandria, Va. 22314.

The Institute of Internal Auditors, P.O. Box 1119, 249 Maitland Ave., Altamonte Springs, Fla. 32701.

For information on educational institutions offering a specialization in accounting, contact:

American Assembly of Collegiate Schools of Business, 605 Old Ballas Rd., Suite 220, St. Louis, Mo. 63141.

Bank Officers and Managers

(D.O.T. 186.117-026, -038, -050, -054, -070, -074, -078; .137-010; .167-014, -050, -054, -058; and .267-018)

Nature of the Work

Practically every bank has a president who directs operations; one or more vice presidents who act as general managers or who are in 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.

Bank officers make decisions within a framework of policy set by the board of directors and existing laws and regulations. They must have a broad knowledge of business activities to relate to the operations of their department. Further, the expanding variety of financial services requires officers with detailed knowledge of allied industries such as insurance, real estate, and securities. Besides supervising financial services, officers advise individuals and businesses and participate in community projects.

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

Loan officers may handle personal, installment, commercial, real estate, or agricultural loans. In the case of personal loan applications, loan officers must evaluate an individual's credit and collateral. In the case of business loan applications, loan officers should be familiar with business operations and be able to analyze a firm's financial statements. Generally, officers should be familiar with economics, production, distribution, merchandising, commercial law, and bank regulations.

Bank officers in trust management require knowledge of financial planning and investment sources for estate and trust administration. The investment income from these accounts may support families, send young people to college, or institute a retirement pension.

Financial service officers—whose role is rapidly expanding—may describe the wide variety of available investments and help persons establish a suitable investment portfolio. They help investors select an appropriate savings account and advise on the purchase of, and sometimes sell, real estate, securities, and insurance.

Operations officers plan, coordinate, and control the workflow, update systems, and strive for administrative efficiency. Careers in bank operations include electronic data processing manager and other positions involving internal and customer services.

A correspondent bank officer is responsible for relations with other banks; a branch 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 financial system, trade relations, and economic conditions is beneficial to those interested in international banking.

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

Whether servicing loans or analyzing interbank transactions, bank officers rely on computers for the rapid transmission of financial information.

Working Conditions

Since a great deal of bank business depends on customers' impressions, officers and managers are provided attractive, comfortable offices and are encouraged to dress conservatively. Bank officers and managers typically work at least 40 hours a week; however, attending civic functions, keeping abreast of community developments, establishing and maintaining business contacts, participating in trade association meetings, and similar activities may also occasionally result in overtime work.

Employment

Bank officers and managers held over 424,000 jobs in 1982. The following tabulation presents the distribution of wage and salary jobs by industry.

Banking	303,000
Commercial and stock savings banks	280,000
Mutual savings banks	11,000
Federal Reserve banks	2,000
Trust companies, nondeposit	1,000
Establishments closely related to banks	10,000
Credit agencies other than banks	121,000
Savings and loan associations	53,000
Personal credit institutions	43,000
Mortgage bankers and brokers	13,000
Business credit institutions	7,000
Agricultural credit institutions	4,000
Rediscount and financing institutions	1,000

Training, Other Qualifications, and Advancement

Bank officer and management positions are filled by management trainees, and by promoting outstanding bank clerks or tellers who have demonstrated the potential for increased responsibilities. 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, serves as excellent preparation for officer-trainee positions. A Master of Business Administration (MBA) in addition to a social science bachelor's degree, which some employers prefer, may provide an even stronger educational foundation. However, banks do hire people with diverse backgrounds such as chemical engineering, nuclear physics, and forestry to meet the needs of the complex, high-technology industries with which they deal.

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Persons interested in becoming bank officers should like to work independently and to analyze detailed information. The ability to communicate, both orally and in writing, is important. They also need tact and good judgment to counsel customers and supervise employees.

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

Although experience, ability, and leadership are emphasized for promotion, advancement may be accelerated by special study. Banks often provide opportunities for workers to broaden their knowledge and skills. Many banks encourage employees to take courses at local colleges and universities. In addition, banking associations sponsor numerous training programs, sometimes in cooperation with colleges and universities. The American Bankers Association (ABA) offers the most extensive national program for bank officers. Each of its dozen schools, located all over the country, deals with a different phase of banking. Those enrolled prepare extensively at home, then attend annual sessions on subjects such as commercial lending, installment credit, and international banking. ABA also sponsors annual seminars and conferences and provides textbooks and other educational materials. Many banks pay all or part of the costs for those who successfully complete courses. The American Institute of Banking, an arm of the ABA, has long filled the same educational need among junior bank staff. (See the statement on bank tellers elsewhere in the *Handbook*.)

Bank operations have been revolutionized by technological improvements in computers and data processing equipment. Knowledge of their applications is important to upgrade managerial skills and to enhance advancement opportunities.

Because banking is an essential part of business, well-trained, experienced officers and managers may transfer to closely related positions in other areas of finance or to positions within other industries, such as manufacturing, that need individuals with banking experience.

Job Outlook

Employment of bank officers is expected to increase faster than the average for all occupations through the mid-1990's. Rising costs due to expanded banking services will require more officers to provide sound management and effective quality control. Greater international trade and investment will stimulate international and domestic banking activities, thus increasing the need for bank officers and managers. Although bank officers and managers exhibit a relatively strong attachment to their occupation, most job openings will result from the need to replace those who transfer to other fields, retire, or leave the occupation for other reasons.

Because of the increasing number of qualified applicants, competition for bank managerial positions is expected to stiffen. Familiarity with computers and other data processing equipment may enhance one's chances for employment. Once employed, managers and officers are likely to work year round, even during periods of slow economic activity, because cyclical swings in the economy seem to have little immediate effect on banking activities.

Earnings

Officer trainees at the bachelor's level generally earned between $1,100 and $1,800 a month in 1982. Those with master's degrees generally started at higher salaries. Graduates with a Master of Business Administration were offered starting salaries of $1,800 to $2,900 a month in 1982.

Salaries of bank officers averaged $24,500 in 1982. The salary level depends upon the particular position and the size and location of the bank. For officers, as well as for other bank employees, earnings are likely to be lower in small towns than in big cities. The top 10 percent of all bank officers earned over $46,800 a year in 1982.

Related Occupations

Bank officers and managers combine formal schooling with experience in one or more areas of banking, such as lending, to provide services for customers. Other occupations which require similar training and ability include business representatives, industrial relations directors, safety council directors, city managers, export managers, and purchasing agents.

Sources of Additional Information

General information about banking occupations, training opportunities, and the banking industry itself is available from:

American Bankers Association, 1120 Connecticut Ave. NW., Washington, D.C. 20036.

Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

National Association of Bank Women, Inc., National Office, 500 N. Michigan Ave., Chicago, Ill. 60611.

The Institute of Financial Education, 111 E. Wacker Dr., Chicago, Ill. 60601.

For information about career opportunities as a bank examiner, contact:

Federal Deposit Insurance Corporation, Director of Personnel, 550 17th St. NW., Washington, D.C. 20429.

Federal Home Loan Bank Board, Personnel Management Office, 1700 G St. NW., Washington, D.C. 20552.

Information on careers with the Federal Reserve System is available from:

Board of Governors, The Federal Reserve System, Personnel Department, Washington, D.C. 20551, or from the personnel department of the Federal Reserve bank serving each geographic area.

State bankers' associations can furnish specific information about job opportunities in their State. And writing directly to a particular bank to inquire about job openings can produce favorable results. For the names and addresses of banks in a specific location as well as the names of their principal officers, consult one of the following directories, which are published twice each year:

The American Bank Directory (Norcross, Ga., McFadden Business Publications).

Polk's World Bank Directory (Nashville, R.L. Polk & Co.).

Rand McNally International Bankers Directory (Chicago, Rand McNally & Co.).

Buyers, Retail and Wholesale Trade

(D.O.T. 162.117-010; .157-018 and -022)

Nature of the Work

The Americans have been invited to a private showing of the latest fashions in Paris. Representing a major New York department store, they sit with a select group in an elegantly furnished room. They watch graceful models float down the runway displaying the latest creations by the world's most famous designers. After some consultation, they purchase thousands, perhaps millions of dollars worth of goods. All in a day's work.

Behind this glamorous facade lies a complex system of production, distribution, and merchandising which caters to the multitude of changing consumer tastes. Two important occupations in this flow of goods are *wholesale buyers* and *retail buyers*. Buyers purchase, for resale, the best available merchandise at the lowest possible prices and expedite the transmission of goods from the manufacturer to the consumer. Wholesale buyers purchase goods directly from manufacturers or from other wholesale firms for resale to retail firms or, occasionally, other wholesale firms. Retail buyers purchase goods from wholesale firms or, occasionally, directly from manufacturers, for resale to the public. (Information about purchasing agents—buyers who purchase goods for internal use by their employing firm—can be found elsewhere in the *Handbook*.).

Wholesale buyers must be familiar with hundreds of domestic and foreign manufacturers in their industry. They must be knowledgeable about the specifications and technical characteristics of the multitude of commodities they purchase from these producers. They must supply, in a timely and cost-effective manner, possibly hundreds of retail purchasers who may be located throughout the Nation. These retail outlets may range in size from giant discount or department store chains to small "mom and pop" stores. This requires careful assessment of manufacturers' productive capacity and the minimum wholesaler inventory level necessary to promptly fill current and future retailers' orders. Wholesale buyers often collaborate with retail buyers, who are in closer contact with the buying public, to forecast changes in consumer preferences.

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Retail buyers must know what motivates consumers to buy. Before ordering merchandise, they study market research reports and past sales records to determine which products are in demand. They keep informed about changes in existing products and the development of new ones. They analyze economic conditions and examine industry and trade publications to purchase the best products at the lowest possible cost. They try to anticipate trends in consumer tastes.

Retail buyers must be familiar with the many manufacturers and wholesale distributors in their industry. Buyers must be able to assess the resale value of goods after a brief inspection and make purchase decisions quickly. They deal with wholesale buyers and store executives to discuss merchandising problems and with advertising personnel to discuss sales promotions. They work closely with assistant buyers and sales workers who are in daily contact with retail customers. This furnishes immediate information about consumer likes and dislikes and facilitates anticipation of taste and style changes. Retail buyers may direct assistants who handle routine functions such as verifying shipment orders and inventory levels.

Technological changes in computers and other business equipment have improved buyers' efficiency. For example, computers give wholesale buyers instant access to the specifications of thousands of commodities, their wholesale inventory records, and their retailers' purchase records. This expedites the distribution of merchandise and decreases inventory storage and costs. Retail buyers' functions have been upgraded. For example, cash registers connected to a computer, known as point-of-sale terminals, allow retail chains to maintain centralized, up-to-the-minute sales and inventory records. This decreases the routine bookkeeping and enables buyers to concentrate on complex merchandising functions and market analysis.

Shipments are regularly spot checked to see if manufacturers maintain buyers' specifications for quality and style.

Working Conditions

Wholesale and retail trade establishments are highly competitive, and buyers often operate under great pressure. Anticipating customers' preferences and ensuring that goods are in stock when they are needed is far from easy, and mistakes can be costly. Buyers must be resourceful, show good judgment, and have self-confidence to make decisions and take risks. Buyers frequently work more than a 40-hour week because of special sales and conferences. Substantial traveling is required and most spend several days a month on the road. However, many successful buyers feel that the stimulation and excitement of the job more than make up for any emotional strain.

Employment

Buyers held about 256,000 jobs in 1982. Two-thirds of the jobs were in retail firms; the rest were in wholesale establishments. Although buyers work in all parts of the country, most are in major metropolitan areas where wholesale and retail stores are concentrated.

Training, Other Qualifications, and Advancement

Familiarity with merchandise and with the wholesaling and retailing business is important for buyers, and many persons with such experience transfer into this occupation. High school and postsecondary marketing and distributive education programs can launch careers in wholesaling and retailing that lead eventually to a buyer's position. (More information about marketing and distributive education appears in the statement on retail trade sales workers elsewhere in the *Handbook*.) Vocational schools, technical institutes, and community colleges offer postsecondary training that prepares students for careers in merchandising. Many colleges and universities offer associate degree or bachelor's degree programs in marketing and purchasing. An increasing number of employers prefer applicants who have a college degree.

Although courses in merchandising or marketing may help in getting started in wholesaling and retailing, they are not essential. Most employers accept college graduates from any field of study for buyer trainee programs which combine classroom instruction in merchandising and purchasing with short rotations to various jobs in the store. This training introduces the new worker to store operations and policies and to the fundamentals of merchandising and management.

Most trainees begin as assistant buyers selling merchandise, supervising sales workers, checking invoices on material received, and keeping account of stock on hand. They gradually assume buying responsibilities. They usually work as assistant buyers for at least a year before becoming buyers. Experienced buyers may advance to merchandise manager, and some advance to executive jobs such as general merchandise manager for distributors, department stores, or chain stores.

Membership in professional and trade associations is helpful in keeping abreast of improvements and changes in industry products and practices and can facilitate advancement to more responsible positions.

Buyers should be good at planning and decisionmaking and have an interest in merchandising. They need leadership ability and communications skills to supervise sales workers and assistant buyers and to deal effectively with manufacturers' representatives and store executives. Because of the fast pace and pressure of their work, buyers need physical stamina and emotional stability.

Job Outlook

Employment of buyers is expected to grow about as fast as the average for all occupations through the mid-1990's, as the wholesale and retail trade industries expand in response to a growing population and higher personal incomes. Most job openings, however, will result from replacement needs, because many experienced buyers transfer to other occupations such as sales or managerial positions or, temporarily, leave the labor force to assume household responsibilities.

Competition for buying jobs is expected to remain keen, for merchandising attracts many college graduates. Prospects are likely to be best for qualified applicants who enjoy the competitive, fast-paced nature of merchandising.

Earnings

Median annual earnings of buyers were $17,300 is 1982. However, their income depends upon the amount and type of product purchased, the employer's sales volume and, to some extent, the buyers' seniority. Buyers for large wholesale distributors and for mass merchandisers such as discount or large chain department stores are among the most highly paid. The top 10 percent of all buyers earned over $34,900 in 1982.

Buyers often earn cash bonuses based on their performance. In addition, many firms have incentive plans, such as profit sharing and stock options.

Related Occupations

Workers in other occupations who need a knowledge of marketing and the ability to assess consumer demand are sales managers, comparison shoppers, manufacturers' sales representatives, insurance sales agents, wholesale trade sales representatives, and travel agents.

Sources of Additional Information

General information about a career in retailing is available from:

National Mass Retailing Institute, 570 Seventh Ave., New York, N.Y. 10018.

Information on schools that teach retailing is available from your State Director of Vocational Education and from:

National Association of Trade and Technical Schools, 2021 K St. NW., Washington, D.C. 20006.

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Association of Independent Colleges and Schools, 1730 M St. NW., Suite 600, Washington, D.C. 20036.

Construction Inspectors (Public Administration)

(D.O.T. 168.167 -030, -034, -038, -046, and -050; .267-010, -102; and 850.387-010)

Nature of the Work

Federal, State, and local government construction inspectors examine the construction, alteration, or repair of highways, streets, sewer and water systems, dams, bridges, buildings, and other structures to insure compliance with building codes and ordinances, zoning regulations, and contract specifications. Construction inspectors generally specialize in one particular type of construction work. Broadly categorized, these are building, electrical, mechanical, and public works. Inspectors usually work alone on small jobs, but several may be assigned to a large, complex project.

Building inspectors inspect the structural quality of buildings. Some may specialize—for example, in structural steel or reinforced concrete buildings. Before construction, inspectors determine whether the plans for the building or other structure comply with building codes regulations and are suited to the engineering and environmental demands of the building site. They visit the worksite before the foundation is poured to inspect the positioning and depth of the footings. They inspect the foundation after it has been completed. The size and type of structure and the rate of completion determine the number of other visits they must make. Upon completion of the project, they conduct a final comprehensive inspection.

Electrical inspectors inspect the installation of electrical systems and equipment to insure that they function properly and comply with electrical codes and standards. They visit worksites to inspect new and existing wiring, lighting, sound and security systems, and generating equipment. They also may inspect the installation of the electrical wiring for heating and air-conditioning systems, kitchen appliances, and other components.

Mechanical inspectors examine plumbing systems including septic tanks; plumbing fixtures and traps; and water, sewer, and vent lines. They also inspect the installation of the mechanical components of kitchen appliances, heating and air-conditioning equipment, gasoline and butane tanks, gas piping, and gas-fired appliances. Some specialize in inspecting boilers, mechanical components, or plumbing.

Public works inspectors insure that Federal, State, and local government construction of water and sewer systems, highways, streets, bridges, and dams conforms to detailed contract specifications. They inspect excavation and fill operations, the placement of forms for concrete, concrete mixing and pouring, and asphalt paving. They also record the work and materials used so that contract payments can be calculated. Public works inspectors may specialize in highways, reinforced concrete, or ditches.

Although inspections are primarily visual, inspectors often use tape measures, metering devices, concrete strength measurers, and other test equipment. They often keep a daily log of their work, take photographs, file reports, and, if necessary, act on their findings. For example, construction inspectors notify the construction contractor, superintendent, or supervisor when they discover a detail of a project that does not in comply with the appropriate codes, ordinances, or contract specifications. If the deficiency is not corrected within a reasonable period of time, they have authority to issue a "stop-work" order.

Many inspectors also investigate reported incidents of "bootlegging," that is, construction or alteration that is being carried on without proper permits. Violators of permit laws are directed to obtain permits and submit to inspection.

Working Conditions

Construction inspectors work indoors and out. They spend about half their time in an office reviewing blueprints, answering letters or telephone calls, writing reports, and scheduling inspections. The rest of their time is spent traveling to construction sites—usually in a government car—and making inspections.

Inspection sites may be dirty and cluttered with tools, materials, or debris. Inspectors may have to climb ladders or several flights of stairs, or may have to crawl beneath buildings. However, the work is not considered hazardous.

Inspectors normally work regular hours. However, after an accident at a construction site, such as a partially collapsed concrete structure, inspectors must respond immediately and may work irregular hours to complete their report.

Inspection work tends to be steady and year round, unlike the seasonal and intermittent nature of employment in many construction occupations. When new construction slows, renovation generally increases, enabling construction inspectors to continue working full time.

Employment

Government construction inspectors held over 39,000 jobs in 1982. About three-fourths worked for local governments, primarily municipal or county building departments. The employment of local government construction inspectors is concentrated in cities and in suburban areas undergoing rapid growth. These governments employ large inspection staffs, including most of the inspectors who specialize in structural steel, reinforced concrete, and boiler inspection.

Public works construction inspectors were employed primarily at the Federal and State levels. Nearly half of the construction inspectors employed by the Federal Government in 1982 worked for the Department of Defense, primarily for the U.S. Army Corps of Engineers. Other Federal employers include the Tennessee Valley Authority and the Departments of Housing and Urban Development, Agriculture, and Interior.

Construction inspector checks an excavation project for compliance with safety regulations.

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Training, Other Qualifications, and Advancement

To become a construction inspector, several years of experience as a construction contractor, supervisor, or craft worker are generally required. Federal, State, and most local governments also require an applicant to have a high school diploma. High school preparation should include courses in drafting, algebra, geometry, and English.

Workers who want to become inspectors should have a thorough knowledge of construction materials and practices in either a general area like structural or heavy construction, or in a specialized area such as electrical or plumbing systems, reinforced concrete, or structural steel; a significant number of construction inspectors have recent experience as carpenters, electricians, plumbers, or pipefitters.

Many employers prefer inspectors who have graduated from an apprenticeship program, have studied engineering or architecture at least 2 years, or have a degree from a community or junior college, with courses in construction technology, blueprint reading, technical mathematics, English, and building inspection.

Construction inspectors must be in good physical condition in order to walk and climb about construction sites. They also must have a motor vehicle operator's license. In addition, Federal, State, and many local governments usually require that construction inspectors pass a civil service examination.

Construction inspectors receive most of their training on the job. During the first couple of weeks, working with an experienced inspector, they learn about inspection techniques; codes, ordinances, and regulations; contract specifications; and recordkeeping and reporting duties. They begin by inspecting less complex types of construction such as residential buildings. The difficulty of their assignments is gradually increased until they are able to handle complex assignments. An engineering degree is frequently needed to advance to supervisory inspector.

Since they advise representatives of the construction industry and the general public on building code interpretation, construction practices, and technical developments, construction inspectors must keep abreast of new building code developments. The Federal Government and most State and large city governments conduct formal training programs to broaden inspectors' their knowledge of construction materials, practices, and inspection techniques. Inspectors who work for small agencies that do not conduct training programs can broaden their knowledge and upgrade their skills by attending State-conducted training programs or by taking college or correspondence courses.

Certification enhances construction inspectors' chances for higher paying, more responsbile positions. Inspectors having substantial experience and education can attain certification by passing stringent examinations on construction techniques, materials, and code requirements developed by the Educational Testing Service of Princeton, N.J. in collaboration with the regional building associations listed below.

Job Outlook

Employment of government construction inspectors is expected to grow more slowly than the average for all occupations through the mid-1990's. Most job openings will arise from the need to replace those who die, retire, or leave the occupation for other reasons.

Employment of construction inspectors is not always directly affected by changes in the levels of housing and commercial building activity. Unlike most construction occupations, inspectors do not usually experience layoffs when construction activity declines. In an upturn, new jobs for inspectors increase but not to the same degree. The construction sector—buffeted recently by the effects of high interest rates—is expected to rebound from its level during the 1981-82 recession.

Because of the increasing complexity of construction technology and the trend toward the establishment of professional standards for inspectors by State and local governments, job prospects should be best for highly experienced craft workers who have some college education or who are certified.

Earnings

The median annual salary of construction inspectors was substantial experience and education can attain certification by $18,100 in 1982. The lowest 10 percent earned $13,000 or less while the highest 10 percent earned over $31,200.

The average salary of inspectors in the Federal Government was $24,400 in 1982. According to limited information, salaries for inspectors working for State or local governments averaged $16,000 a year. Salaries in large metropolitan areas are substantially higher than those in small local jurisdictions. Salaries in the North and West are slightly higher than salaries in the South.

Related Occupations

Construction inspectors combine a knowledge of construction principles and law with the ability to coordinate data, diagnose problems, and communicate with people. Other occupations involving a combination of similar skills are drafters, estimators, industrial engineering technicians, and surveyors.

Sources of Additional Information

For information about a career as a State or local government construction inspector, contact your State or local employment service or the following regional building associations:

International Conference of Building Officials, 5360 South Workman Mill Rd., Whittier, Calif. 90601.

Building Officials and Code Administrations International, Inc., 17926 Halstead St., Homewood, Ill. 60430.

Southern Building Code Congress International, Inc., 900 Montclair Road, Birmingham, Ala. 35213.

Persons interested in a career as a construction inspector with the Federal Government can get information from:

U.S. Office of Personnel Management, 1900 E St. NW., Washington, D.C. 20415.

Health and Regulatory Inspectors

(D.O.T. 073.161-010; .261-010; .264-010; 079.117-018; 160.167-046; 168.167-010, -022, -026, -042, -062, and -074; .261-010; .264-010; .267-018, -022, -042 through -066, -074 through -082, -090, -098, -106, and -110; .287; .367-018; .387-010; 169.267-030; .284-010; 379.364-010; and 620.281-014)

Nature of the Work

Protecting the public from health and safety hazards, prohibiting unfair trade and employment practices, controlling immigration, preventing entry of prohibited matter, and raising revenue are responsibilities of government. Health and regulatory inspectors enforce the laws and regulations that govern these responsibilities. For a discussion of another type of inspector, see the statement on construction inspectors (public administration) elsewhere in the *Handbook*.

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 Inspectors. Health inspectors work with engineers, chemists, microbiologists, and health workers to insure compliance with public health and safety regulations governing food, drugs, cosmetics, and 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: Consumer safety, food, agricultural quarantine, and environmental health inspectors. In addition, some inspectors work in a field closely related to food inspection—agricultural commodity grading.

Most *consumer safety inspectors* specialize in food, feeds and pesticides, weights and measures, cosmetics, or drugs and medical equipment inspection. Some are proficient in several areas. Working individually or in teams under a senior or supervisory inspector, they periodically check firms that produce, handle, store, and market food, drugs, and cosmetics. They look for inaccurate product labeling, and for decomposition or chemical or bacteriological contamination that could result in a product becoming harmful to health. They use portable scales, cameras, ultraviolet lights, container sampling devices, thermometers, chemical testing kits, radiation monitors, and other equipment to ascertain violations. They send product samples collected as part of their examinations to laboratories for analysis.

After completing their inspection, inspectors discuss their observations with plant managers

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or officials and point out areas where corrective measures are needed. They write reports of their findings, and, when necessary, compile evidence that may be used in court if legal action must be taken to enforce the law.

Federal and State laws empower *food inspectors* to inspect meat, poultry, and their by-products to insure that they are wholesome and safe for public consumption. Working as an onsite team under a veterinarian, they inspect meat and poultry slaughtering, processing, and packaging operations. They also check for correct product labeling and proper sanitation.

Agricultural quarantine inspectors protect American agricultural products from the spread of foreign plant pests and animal diseases. To safeguard crops, forests, gardens, and livestock, they inspect ships, aircraft, railroad cars, and motor vehicles entering the United States for restricted or prohibited plant or animal materials.

Environmental health inspectors, or sanitarians, who work primarily for State and local governments, insure that food, water, and air meet government standards. They 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. They oversee the treatment and disposal of sewage, refuse, and garbage. They examine places where pollution is a danger, test for pollutants, and collect air or water samples for analysis. They determine the nature and cause of pollution and initiate action to stop it.

In large local and State health or agriculture departments, environmental health inspectors may specialize in milk and dairy products, food sanitation, waste control, air pollution, institutional sanitation, or occupational health. In rural areas and small cities, they may be responsible for a wide range of environmental health activities.

Agricultural commodity graders apply quality standards to aid the buying and selling of commodities and to insure that retailers and consumers receive wholesome and reliable products. They generally specialize in an area such as eggs and egg products, meat, poultry, processed or fresh fruits and vegetables, grain, tobacco, cotton, or dairy products. They examine product samples to determine quality and grade, and issue official grading certificates. Graders also may inspect the plant and equipment to maintain sanitation standards.

Regulatory Inspectors. Regulatory inspectors insure compliance with laws and regulations that protect the public welfare. Important types of regulatory inspectors are: Immigration; customs; air safety; railroad; motor vehicle; occupational safety and health; mine; wage-hour compliance; and alcohol, tobacco, and firearms inspectors.

Immigration inspectors interview and examine people seeking to enter the United States and its territories. They inspect passports to determine whether people are legally eligible to enter and to verify their citizenship status and identity. Immigration inspectors also prepare reports, maintain records, and process applications and petitions for immigration or temporary residence in the United States.

Customs inspectors enforce laws governing imports and exports. Stationed at airports, seaports, and border crossing points, they examine, count, weigh, gauge, measure, and sample commercial cargoes entering and leaving the United States to determine admissibility and the amount of tax that must be paid. They also inspect baggage and articles worn by passengers and crew members to insure that all merchandise is declared, proper duties are paid, and illegal contraband is not present.

Postal inspectors observe the functioning of the postal system and recommend improvements. They investigate criminal activities such as theft and misuse of the mail. In instances of suspected mismanagement or fraud, they conduct management or financial audits. They collaborate with other government agencies, such as the Internal Revenue Service, as members of special task forces.

Aviation safety inspectors insure that Federal Aviation Administration (FAA) regulations which govern the quality and safety of aircraft equipment and personnel are maintained. Aviation safety inspectors may inspect aircraft and equipment manufacturing, maintenance and repair, or flight operations procedures. They usually specialize in either commercial or general aviation aircraft. They also examine and certify aircraft pilots, pilot examiners, flight instructors, schools, and instructional materials.

Railroad inspectors verify the compliance of railroad systems and equipment with Federal regulations. They investigate accidents. They review railroads' operating practices to assess historical compliance with safety regulations.

Motor vehicle inspectors verify the compliance of automobiles and trucks with State requirements for safe operation and emissions. They inspect truck cargoes to assure compliance with legal limitations on permisible gross weight and hazardous cargoes.

Occupational safety and health inspectors visit places of employment to detect unsafe or unhealthy working conditions. They inspect machinery and equipment and observe employees to see that safety equipment is used and proper precautions are taken in accordance with Federal, State, or local government safety standards and regulations.

Occupational safety and health inspectors usually visit a plant, factory, or other workplace in response to a complaint or an accident. In their reports, they describe hazards and cite safety standards or regulations that have been violated. They also discuss their findings with the employer or plant manager and urge that violations be promptly corrected.

Mine inspectors work to insure the health and safety of miners. They visit mines and related facilities to obtain information on health and safety conditions and to enforce safety laws and regulations.

Mine inspectors discuss their findings with the management of the mine, write reports of their findings and decisions, and issue notices that describe violations and hazards that must be corrected. They also investigate and report on mine accidents and direct rescue and fire-fighting operations when fires or explosions occur.

Wage-hour compliance inspectors inspect employers' time, payroll, and personnel records to insure compliance with Federal laws on minimum wages, overtime, pay, employment of minors, and equal employment opportunity. They often interview employees to verify the

Health inspectors oversee compliance with public health regulations.

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employer's records and to check for complaints.

Alcohol, tobacco, and firearms inspectors inspect distilleries, wineries, and breweries; cigar and cigarette manufacturing plants; wholesale liquor dealers and importers; firearms and explosives manufacturers, dealers, and users; and other regulated facilities. They insure compliance with revenue laws and other regulations on operating procedures, unfair competition, and trade practices, and determine that appropriate taxes are paid.

Working Conditions

Most health and regulatory inspectors live an active life; they meet many people and work in a variety of environments. Their jobs often involve considerable fieldwork, and some inspectors travel frequently. They are furnished with an automobile or are reimbursed for travel expenses.

At times, inspectors have unfavorable working conditions. For example, food, and alcohol, tobacco, and firearms inspectors frequently come in contact with strong, unpleasant odors. Mine inspectors often are exposed to the same hazards as miners. Many inspectors work long and often irregular hours.

Employment

Health and regulatory inspectors held over 101,000 jobs in 1982. About 36 percent were employed by the Federal Government, 34 percent by State governments, and the rest by local governments.

The largest single employer of consumer safety inspectors is the U.S. Food and Drug Administration, but the majority work for State governments. Most food inspectors and agricultural commodity graders in processing plants are employed by the U.S. Department of Agriculture. Agricultural quarantine inspectors work for the U.S. Public Health Service or the U.S. Department of Agriculture. Most environmental health inspectors work for State and local governments.

Most Federal regulatory inspectors work in regional and district offices throughout the United States. Aviation safety inspectors work for the Federal Aviation Administration; wage-hour compliance officers, for the Department of Labor; and alcohol, tobacco, and firearms inspectors, for the Treasury Department. Occupational safety and health inspectors and mine inspectors also work for the Department of Labor, as well as for many State governments. Like agricultural quarantine inspectors, immigration and customs inspectors work at U.S. airports, seaports, and border crossing points, and at foreign airports and seaports. Immigration inspectors are employed by the Department of Justice. Customs inspectors work for the Treasury Department.

Training, Other Qualifications, and Advancement

Because of the wide range of inspector jobs and varying starting levels, qualifications for employment differ greatly. Requirements are a combination of education, experience, and a written examination. Generally, agencies prefer applicants who are college graduates and whose course work is related to the job.

Food inspectors must have related experience and pass an examination based on specialized knowledge.

Aviation safety inspectors must have considerable experience in aviation maintenance and knowledge of the industry and relevant Federal laws. In addition, FAA approved pilot and medical or mechanic certificates are required. Some also require a FAA flight instructor rating. Many aviation safety inspectors have had flight training and mechanical training in the Armed Forces. No written examination is required.

Applicants for mine safety inspector positions generally must have experience in mine safety, management, or supervision, or possess a skill such as electrical engineering (for mine electrical inspectors). In some cases, a general aptitude test may be required.

Some civil service examinations, including those for agricultural quarantine inspectors and agricultural commodity graders, rate applicants solely on their experience and education and require no written examination.

Qualifications usually are similar for inspectors at the State and local level. Environmental health inspectors, called sanitarians in many States, usually must have a bachelor's degree in environmental health or the physical or biological sciences. In most States, they are licensed by examining boards.

All inspectors are trained in applicable laws and inspection procedures through a combination of classroom and on-the-job training. In general, people who want to become health and regulatory inspectors should be able to accept responsibility and like detailed work. They should be neat and personable and able to express themselves well orally and in writing.

Federal Government inspectors whose job performance is satisfactory advance through their career ladder to a specified full performance level. Above this level (usually supervisory positions), advancement is competitive, based on agency needs and individual merit.

Job Outlook

Employment of health and regulatory inspectors as a group is expected to increase more slowly than the average for all occupations through the mid-1990's. Employment growth is expected to be constrained by slow growth in government regulatory programs and in government spending. Most job openings will be to replace those who transfer to other occupations, retire, or leave the labor force for other reasons.

Because health and regulatory inspectors are government workers, their employment is seldom affected by general economic fluctuations. Most inspectors work in programs which enjoy wide public support. As a result, they are less likely to lose their jobs than many other workers when government programs are cut.

Earnings

In the Federal Government, the average starting salary for aviation safety officers and mining inspectors was $19,700 in 1982. Other health and regulatory inspectors and graders started at $13,000, on the average, in 1982.

Experienced food inspectors and agricultural commodity graders averaged about $21,300 a year in 1982. Experienced immigration and customs inspectors averaged about $23,400 a year; agricultural quarantine and alcohol, tobacco, and firearms inspectors about $26,800 a year; and wage-hour compliance inspectors more than $30,800 a year in 1982. Experienced consumer safety inspectors, mine inspectors, and occupational safety and health inspectors employed by the Federal Government averaged $33,600 in 1982. Experienced aviation safety officers averaged over $39,400 a year. Postal inspectors averaged $37,000 a year in 1982.

According to a 1982 survey by the International Personnel Management Association, nonsupervisory environmental health inspectors working for selected U.S. cities and counties received average starting salaries of almost $16,900 in 1982; those working for State governments started at about $2,200 less. Experienced environmental health inspectors working for State governments earned over $16,400, but top supervisors and administrators made as much as $30,700 in 1982.

Related Occupations

Health and regulatory inspectors are responsible for seeing that government laws and regulations are obeyed. Revenue agents, construction inspectors, State and local police officers, and fish and game wardens also enforce laws.

Sources of Additional Information

Information on Federal Government jobs is available from local offices of the State employment service, area offices of the U.S. Office of Personnel Management, and Federal Job Information Centers in large cities throughout the country. For information on a career as a specific type of inspector, the Federal department or agency that employs them may also be contacted directly.

Information about State and local government jobs is available from State civil service commissions, usually located in each State capital, or from local government offices.

Health Services Administrators

(D.O.T. 075.117-022; 187.117-010, -018, .137-014, .167 -022, -034, -038, -090, and 188.117-082)

Nature of the Work

The unprecedented growth in expenditures for medical care in the United States since the mid-1960's has produced new, larger, and more complex health and medical care organizations and a recognition of the need for competent administration. Public demand for better access, accountability, and cost control has added new pressures, while changes in medical technology, financing patterns, and public regulation have made the job of good management more complex.

Health services administrator is an inclusive term for individuals in a variety of positions

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who plan, organize, coordinate, and evaluate services and resources in medical facilities and public health organizations. Employers include hospitals, clinics, health maintenance organizations (HMO'S), long-term care, ambulatory care, and mental health facilities, home health agencies, and rehabilitation centers. Administrators also work in State and local public health departments.

We can find three functional levels of administration in most large health care settings—executive, internal management, and specialized staff. The chief executive officer provides overall management direction, but also is concerned with community outreach, planning, policymaking, response to government agencies and regulations, and negotiating. This phase of the job often includes speaking before civic groups, promoting public participation in health programs, and coordinating the activities of the organization with those of government or community agencies. Institutional planning is an increasingly important responsibility for chief administrators, who must assess the need for services, personnel, facilities, and equipment and recommend such changes as shutting down a maternity ward, for example, or opening an outpatient clinic. Chief administrators need leadership ability as well as technical skills in order to respond effectively to the community's requirements for health care while, at the same time, satisfying demand for financial viability, cost containment, and public and professional accountability.

Day-to-day management, particularly in large facilities, may be the responsibility of one or more associate or assistant administrators, who work with service unit administrators and staff specialists. Depending on the size of the organization, associate or assistant administrators may be responsible for budget preparation and finance; personnel administration and in-service training; information management; coordination of the activities of the medical, nursing, physical plant, and other operating departments.

Health administrators often start out in areas such as finance, personnel, planning, or purchasing.

As the health care system becomes more complex, specialists with expertise in financial management, systems analysis, statistics, labor relations, marketing, and planning may join the administrative staff.

Working Conditions

Health administrators often work long hours. Facilities such as nursing homes and hospitals operate around the clock, and administrators may be called at all hours to settle emergency problems. The job also may include travel to attend meetings or to inspect health care facilities.

Employment

Health services administrators held about 303,000 jobs in 1982. Hospitals and nursing homes provide about 3 out of 5 wage and salary jobs, as the accompanying chart shows. The remaining jobs are in clinics, rehabilitation centers, home health agencies, health maintenance organizations, and group practices, for the most part.

Some health administrators work for State and local health departments and still others direct the operations of nurses registries and medical and dental laboratories.

Training, Other Qualifications, and Advancement

As is generally true with managerial jobs, most entrants transfer from other occupations. Knowledge of management principles and practices is the essential requirement for a position in this field, and such knowledge often is gained through work experience. Nonetheless, formal educational preparation is important, especially for those who wish to advance in the profession.

Academic programs in health administration, leading to a bachelor's, master's, or doctoral degree, are offered by colleges, universities, and schools of public health. The various degree programs provide different levels of career preparation. The master's degree—in hospital administration, health administration, or public health—is regarded as the standard credential for many positions in this field. Educational requirements vary with the size of the organization and the amount of responsibility involved. Generally, larger organizations require more specialized academic preparation than smaller ones do.

Academic programs in health administration do not provide the only way of entering this field, however. For some positions, a degree in business, personnel administration, or public administration provides an appropriate background, and many graduate programs in these disciplines offer concentrations in health administration. A survey conducted by the National Center for Education Statistics (NCES) shows that recent graduates of master's programs who found jobs as health services administrators came primarily from business, management, and the health professions—including hospital and health care administration. Those who entered the field with a bachelor's degree, however, represented a variety of disciplines, mostly in the behavioral and social sciences.

In 1982, about 100 colleges and universities offered bachelor degree programs in health services administration. About 70 schools had programs leading to the master's degree in hospital or health services administration; 17 of these programs were in schools of public health. Some schools offer joint degree programs, leading to a master's in public health and a master's in business administration, for example.

To enter graduate programs, applicants must have a bachelor's degree, with courses in natural sciences, psychology, sociology, statistics, accounting, and economics. Competition for entry to these programs is keen, and applicants need above-average grades to gain admission. The programs generally last about 2 years and include supervised administrative experience in hospitals, clinics, or health agencies. Programs may include courses such as hospital organization and management, accounting and budget control, personnel administration, public health administration, and the economics of health care.

New graduates with master's degrees in health or hospital administration may be hired by hospitals as assistant administrators, department heads, or project directors, and some are placed in administrative residencies, or fellowships, offered by some hospitals and health services organizations. These positions are normally staff jobs that last perhaps 1 year and provide new graduates with additional exposure to a broad sampling of health administration.

New graduates from master's degree programs in public health are qualified for jobs as program administrators or policy analysts in public health departments, voluntary agencies and professional associations such as the American Heart Association or the American Hospital Association, health insurance plans, health policy research institutes, corporate health-care provider chains, and consulting firms.

Relatively few master's degree recipients take entry level administrative positions in nursing homes or life-care communities, although graduates of the small number of long-term care administration programs are likely to do so. Many nursing home administrators pursue graduate education while employed, however.

New recipients of bachelor's degrees in health administration usually begin their careers as administrative assistants or department heads in hospitals, or as assistant administrators in small hospitals or in nursing homes.

The Ph.D. degree usually is required for positions in teaching or research, and is an asset for those seeking administrative jobs in larger, more prestigious health organizations. Although some public health departments still require chief administrators to be physicians, the trend is away from this. Nursing service administrators are usually chosen from among supervisory registered nurses with administrative abilities and advanced education.

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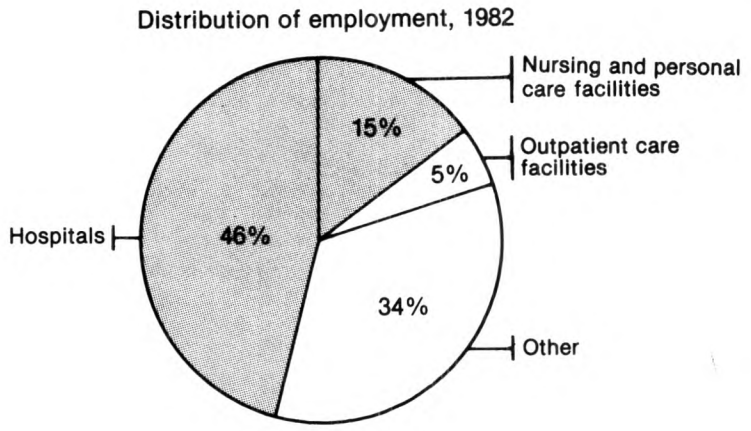
3 out of 5 jobs for health administrators are in hospitals or nursing homes.



SOURCE: Bureau of Labor Statistics

Licensure is not required in most areas of health services administration, except for nursing home or long-term care administration. About 18 States currently require at least 2 years of college for licensure, while 20 require a bachelor's degree. All States and the District of Columbia require these administrators to pass a qualifying licensing examination, and most students prepare for it by completing a special course of study. These preparatory courses, usually consisting of 100 to 200 hours of study in long-term care administration, are available through some colleges, universities, and home study programs. The licensing examination covers principles of administration; management of a long-term care facility; the role of government in long-term care; environmental health and safety; and medical, psychological, and social aspects of patient care. Nearly half the States require applicants to complete an internship known as an Administrator-in-Training program before taking the licensure examination. This internship generally lasts 1 year and is supervised by a licensed administrator. Since requirements vary from State to State, persons considering a career in long-term care administration should investigate licensing requirements where they wish to work.

Health services administrators are often responsible for millions of dollars of facilities and equipment and hundreds of employees. They need a command of business and communication skills that allows them to make timely policy decisions and to motivate subordinates to implement those decisions. Administrators, especially head administrators, of all types of health organizations need to be self-starters.

In order to create an atmosphere favorable to good patient care, administrators must like people, enjoy working with them, and be able to deal effectively with them. Administrators also should be good at public speaking.

Health administrators advance in the profession by moving into more responsible and higher paying positions. They may do this within their own institution, or by shifting to another health care facility or organization. Frequently, an administrator's first job in a large institution is fairly narrow in scope—department head in charge of purchasing, for example. Advancement occurs with promotion to successively more responsible jobs such as assistant or associate administrator and, finally, chief administrator. Hospital administrators sometimes begin their careers in small hospitals in positions with broad responsibilities, such as assistant administrator. Regardless of the path of advancement chosen, the ultimate occupational goal in hospitals and nursing homes is the position of chief executive or chief administrative officer.

Outside the more traditional avenues of advancement, many administrators take staff positions with the Veterans Administration, U.S. Public Health Service, or State or local departments of public health. Others find positions with voluntary health agencies such as the American Cancer Society or with trade and professional associations in the health care field. A growing number of jobs are available with consulting firms that provide health management services. Jobs also are available in community health planning organizations. Whether mandatory or voluntary, official or unofficial, community health planning is a process for governing and managing the health and medical care system to promote equal access to quality health care at a reasonable cost, and individuals with academic training or experience in health administration are well suited for health planning positions.

Job Outlook

Employment of health services administrators is expected to grow faster than the average for all occupations through the mid-1990's as the health industry expands and health services management becomes more complex. Most job openings, however, will result from the need to replace personnel who transfer to another field or retire.

The various areas of health administration will grow at different rates in the years ahead. Hospital administration may not contribute as heavily as in the past to employment opportunities for health administrators. Although the typical hospital has grown in size and the scope and sophistication of hospital services has increased, the number of hospitals is decreasing. Population shifts and financial pressures have caused some hospitals to close; at the same time, hospitals are opening and expanding in areas of population growth—notably in the South and West.

Furthermore, the American health care system is likely to experience a number of changes in coming years as a result of efforts to control the rapid increase in health care costs. Hospitals, as the largest category by far of health care expenditure, will be a focal point for cost containment. Demand for some catgories of administrative personnel is likely to rise to meet the need for more efficient management, to provide closer monitoring of costs, and to administer new reimbursement systems. Prospects should be bright in such areas as finance, strategic planning, marketing, management information systems, and purchasing. On the other hand, if new measures shift a significant portion of health care services to non-hospital providers, demand for administrators in hospitals could decline. While it is impossible to predict what remedies will be applied to control costs, it is clear that cost containment will produce important changes in the organization and delivery of hospital care.

Outside the hospital environment, demand for administrators will be further stimulated by the formation of health maintenance organizations, group medical practices, and a variety of freestanding health care facilities including emergency centers, surgicenters, and rehabilitation centers. In the past decade, health maintenance organizations have grown in number and membership and they will continue to provide jobs for health administrators. Physicians forming group practices to take advantage of economies of scale and shared expenses are expected to provide many new opportunities for administrators in this area of medical practice management. Freestanding health care facilities such as outpatient surgical centers and after-hours clinics are expected to experience very rapid growth due to their convenience and competitive fee structure. As these facilities become more widespread, additional jobs will be generated. Nursing homes and long term care facilities also will need more administrators to handle the increasing amount of administrative work expected as these facilities expand and diversify.

Enrollments in graduate programs in health administration rose rapidly during the 1970's and graduations from those programs have remained at a relatively high level. In addition, administrative specialists with graduate degrees in other fields—especially business—are entering the profession. Consequently, competition for jobs has intensified, particularly in hospital administration. This situation is expected to continue, and it may become difficult for persons with less than a graduate education to obtain administrative jobs in hospitals. In nursing homes and other long-term care facilities, where a graduate degree in health administration is not ordinarily a requirement, job opportunities will be good for individuals with a business or management background.

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Earnings

The personal standing and performance of the administrator, hospital size, geographic location, and the type of hospital ownership are all factors in determining the earnings of hospital administrators. According to a survey of compensation conducted for *Modern Healthcare* magazine, administrators in hospitals with fewer than 100 beds earned an average income of about $37,000 in 1982. In hospitals of 100 to 349 beds, administrators averaged $57,500 annually. In the largest hospitals, those with more than 1,000 beds, chief administrators averaged more than $85,000. The associate administrator is directly under the chief administrator. Earnings for associate administrators ranged from an average of $28,000 annually in the smallest hospitals to $58,000 in very large hospitals.

Nursing and personal care home administrators usually earn lower salaries than those paid administrators of similar size hospitals.

Starting salaries for recent graduates of master's programs in health administration averaged $24,500 in 1981, according to a national survey conducted by the Association of University Programs in Health Administration. Recent recipients of master's degrees in health administration starting work in Veterans Administration hospitals earned $20,256 a year in late 1982. The average salary paid administrators of Federal hospitals was $40,800.

Related Occupations

Health services administrators plan programs, set policies, and make decisions for a health service agency or institution. Other administrators with similar responsibilities include social welfare administrators, emergency medical services coordinators, community organization directors, college or university department heads, medical-record administrators, and recreation superintendents.

Sources of Additional Information

Information about health administration and academic programs in this field is available from:

American College of Hospital Administrators, 840 North Lake Shore Dr., Chicago, Ill. 60611.

Association of University Programs in Health Administration, 1911 Fort Myer Drive, Suite 503, Arlington, Va. 22209.

National Health Council, Health Careers Program, 70 West 40th St., New York, N.Y. 10018.

American College of Health Care Administrators, P.O. Box 5890, 4650 East-West Hwy., Bethesda, Md. 20814.

Hotel Managers and Assistants

(D.O.T. 163.117-018; 185.167-106; 187.117-038, .167-046, -062, -078, -106, -110, -122, -126; 238.137-010; and 320.137-014)

Nature of the Work

Hotel managers are responsible for the profitable operation of their establishments. They also oversee the management of the accounting, marketing, personnel, security, front office, and maintenance departments. Satisfying guests, handling problems, and coping with the unexpected are important parts of the job.

The job of hotel manager can be particularly hectic around check out time.

General managers of large hotels usually have an assistant and department heads, such as sales managers, who run the various operations. On the other hand, a small hotel or motel may require only a limited staff; and the manager may assume various duties such as reservations, room assignments, and superintending housekeeping.

Large hotel and motel chains often centralize some activities, such as purchasing and advertising, so that individual hotels in the chain may not need managers for these departments. Managers who work for chains may be assigned to organize a newly built or purchased hotel or to reorganize an existing hotel or motel that is not operating successfully.

Working Conditions

Since hotels are open around the clock, night and weekend work is common. Hotel employees frequently must work on shifts. Managers who live in the hotel usually have regular work schedules, but they may be called for work at any time. Some managers employed by resort hotels work on a seasonal basis.

Hotel managers sometimes experience the pressures of coordinating a wide range of functions. Conventions and large groups of tourists may present unusual problems. Dealing with irate patrons can also be stressful. The job can be particularly hectic for front office managers around checkout time.

Employment

Hotel and motel managers held almost 67,000 wage and salary jobs in 1982.

Training, Other Qualifications, and Advancement

Experience generally is the most important consideration in selecting managers. This especially applies to food service managers, because the hotel restaurant and cocktail lounge are of great importance to the success of the entire establishment.

However, employers increasingly are emphasizing college or specialized postsecondary education. A bachelor's degree in hotel and restaurant administration provides particularly strong preparation for a career in hotel management. In 1982, about 100 colleges and universities offered 4-year programs in this field. Several hundred junior colleges, technical institutes, and other academic institutions also have courses in hotel work that provide a good background. However, because more aspiring hotel managers are seeking formal training, applicants to these programs face increasing competition.

Included in many programs in hotel management are courses in hotel administration, accounting, economics, marketing, data processing, housekeeping, food service management and catering, and hotel maintenance engineering. Part-time or summer work in hotels and restaurants is encouraged because the experience gained and the contacts with employers may benefit students when they seek full-time employment after graduation.

Managers should have initiative, self-discipline, and the ability to organize and direct the work of others. They must be able to solve problems and concentrate on details.

Sometimes large hotels sponsor specialized, on-the-job management training programs which enable trainees to rotate among various departments and receive a thorough knowledge of the hotel's operation. Other hotels may help finance the necessary training in hotel management for outstanding employees.

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Most hotels promote employees who have proven their ability. Newly built hotels, particularly those without well-established on-the-job training programs, often prefer experienced personnel for managerial positions. Hotel and motel chains may offer better opportunities for advancement than independently owned establishments, because employees can transfer to another hotel or motel in the chain or to the central office if an opening occurs. Career advancement can be accelerated by completion of certification programs offered by the associations listed below. These programs generally require a combination of course work, examinations, and experience.

Job Outlook

Employment of salaried hotel managers is expected to grow faster than the average for all occupations through the mid-1990's as additional large hotels and motels are built and chain and franchise operations spread. Most openings are expected to occur as experienced managers transfer to other occupations, die, retire, or stop working for other reasons. Seasonal employment opportunities will be available in resort establishments that are open only part of the year.

Applicants who have college degrees in hotel administration should have a decided advantage in seeking entry positions and later advancement.

Earnings

In 1982, average annual earnings of salaried hotel managers and assistants were about $22,000, according to a survey conducted by the American Hotel and Motel Association. Fifty percent of these managers earned between $15,000 and $26,000; the top 10 percent earned $36,000 or more.

However, salaries varied greatly because of differences in duties and responsibilities. For example, general managers averaged $32,000, whereas executive housekeepers averaged $15,000. Salaries also depend upon the size and sales volume of the hotel and its geographic location. The manager's level of experience is also an important factor. In 1982, salaries of general managers ranged from under $20,000 to over $65,000; executive housekeepers' salaries ranged from under $12,000 to over $30,000. Managers may earn bonuses ranging from 5 to 25 percent of their basic salary in some hotels. In addition, they and their families may be furnished with lodging, meals, parking, laundry, and other services.

Most managers and assistants receive 5 to 10 paid holidays a year, paid vacation, sick leave, life insurance, medical benefits, and pension plans. Some hotels offer profit sharing plans, educational assistance, and other benefits to their employees.

Related Occupations

Hotel managers and assistants are not the only workers concerned with organizing and directing a business where pleasing people is very important. Others with similar responsibilities include apartment building managers, department store managers, and office managers.

Sources of Additional Information

Information on careers, scholarships, and certification programs in the lodging industry may be obtained from:

The American Hotel and Motel Association, 888 7th Ave., New York, N.Y. 10019.

Hotel Sales Management International, 1400 K St. NW., Suite 810, Washington, D.C. 20005.

National Executive Housekeepers Association, Inc., Second Avenue, Business and Professional Building, Gallipolis, Ohio 45631.

For a directory of colleges and other schools offering programs and courses in hospitality education, write to:

Council on Hotel, Restaurant, and Institutional Education, Henderson Human Development Building, Room 118, University Park, Pa. 16802.

Personnel and Labor Relations Specialists

(D.O.T. 079.127-010; 166.067-010, .117, .167-014, -018, -022, -026, -030, -034, .227-010, .267-018, -022 -030; and 169.207-010)

Nature of the Work

Attracting the best employees available and matching them to the jobs they can do best is important for the success of any organization. But many enterprises are too large to permit close contact between management and employees. Instead, personnel and labor relations specialists provide this link—helping management make effective use of employees' skills, and helping employees find satisfaction in their jobs and working conditions. Although some jobs in this field require only limited contact with people outside the office, most involve frequent contact. Dealing with people is an essential part of the job.

Personnel specialists and labor relations specialists concentrate on different aspects of employer-employee relations. Personnel specialists interview, select, and recommend applicants for job openings. They handle wage and salary administration, training and career development, and employee benefits. They also keep informed of rules and regulations pertaining to affirmative action and equal employment opportunity and oversee the implementation of policies governing hiring and advancement. "Labor relations" means union-management relations, and people who specialize in this field work in unionized establishments, for the most part. They help company officials prepare for collective bargaining sessions, participate in contract negotiations, and handle labor relations matters that come up every day.

In a small organization, one person can handle the interviewing and hiring. By contrast, in a large firm the professional staff of the personnel department may include recruiters, interviewers, job analysts, benefits specialists, training specialists, and labor relations specialists. Personnel clerks and assistants handle routine tasks such as issuing forms, maintaining files, compiling statistics, and answering inquiries.

Personnel work often begins with the *recruiter*, who maintains contacts within the community and may travel extensively—usually to college campuses—to search for promising job applicants. Recruiters talk with applicants, and recommend those who appear qualified to fill vacancies. They may administer tests and check references. These workers need to be thoroughly familiar with the organization and its personnel policies to discuss wages, working conditions, and promotional opportunities with prospective employees. They also need to keep informed about equal employment opportunity (EEO) and affirmative action guidelines.

EEO representatives or affirmative action coordinators handle this area in large organizations. They investigate and resolve EEO grievances, examine corporate practices for possible violations, and compile and submit EEO statistical reports.

Job analysts (D.O.T. 166.267-018), sometimes called *compensation analysts*, do very exacting work. They collect and examine detailed information about job duties to prepare job descriptions. These descriptions explain the duties, training, and skills each job requires. Whenever a large organization introduces a new job or reviews existing ones, it calls upon the expert knowledge of the job analyst.

Establishing and maintaining a firm's pay system is the principal job of the *compensation manager* (D.O.T. 166.167-022). Assisted by staff specialists, compensation managers devise ways to ensure fair and equitable pay rates. They may conduct surveys to see how their rates compare with others and to see that the firm's pay scale complies with laws and regulations.

Human resource development is emerging as a major specialization within personnel administration. *Training specialists* (D.O.T. 079.127-010; 166.167-026, .227-010) are responsible for employee education and training. Trainers conduct orientation sessions and arrange on-the-job training for new employees. They also develop programs that help employees keep their skills up-to-date—instruction in new procedures or in the operation of new equipment, for example. In addition, these specialists assess employee training needs, maintain records, and evaluate training effectiveness. To help employees prepare for future responsibilities, they may set up individualized training plans, to strengthening existing skills or to teach new skills. Career development may involve study outside the company or rotation within the firm. Depending on the firm's size, goals, and objectives, the responsibilities of training specialists vary greatly.

Employee-benefits managers (D.O.T. 166.117-014, 166.167-018) handle the company's employee benefits program, notably its insurance and pension plans. Expertise in designing and administering benefits programs has increased enormously in importance since the Employee Retirement Income Security Act (ERISA) was enacted. In addition to health

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insurance and pension coverage, many firms now offer their employees dental insurance, accidental death and disability insurance, auto insurance, homeowners' insurance, stock options, profit sharing, and thrift/savings plans. Benefits analysts and benefits administrators handle these programs and also may develop and coordinate services as diverse as van-pooling, child care, lunchrooms and company cafeterias, newsletters, health promotion and physical fitness, and alcoholism counseling. Some firms provide personal and financial counseling for employees approaching retirement age.

Occupational safety and health programs are handled in various ways. In small companies especially, accident prevention and industrial safety are the responsibility of the personnel department—or of the labor relations specialist, if the union has a safety representative. Increasingly, however, a safety engineer or industrial hygienist is in charge of a separate safety department.

Labor relations specialists (D.O.T. 166.167-034) advise management on all aspects of union-management relations. When a collective bargaining agreement is up for negotiation, they provide background information for management's position, which requires familiarity with economic and wage data as well as extensive knowledge of labor law and collective bargaining trends. Although the director of labor relations or other top-ranking official representing the employer negotiates the agreement, the labor relations staff play an important role.

The labor relations staff interprets and administers the contract, particularly grievance procedures. Labor relations specialists might work with the union on seniority rights under the layoff procedure of the contract, for example, or meet with the union steward about a grievance. Doing the job well means staying abreast of current developments in labor law, including arbitration decisions, and maintaining continuing liaison with union officials.

Personnel specialists in government and those in large business firms do essentially the same kind of work, although there are some differences. Public personnel specialists deal with civil service employees whose jobs are strictly classified as to entry requirements, duties, and pay. Therefore much of the emphasis in public personnel work is on job analysis. Training and career development are growing in importance in the public sector, however, and greater union activity among government workers has created a need for labor relations specialists to handle negotiations, grievances, and arbitration cases for Federal, State, and local government agencies.

Working Conditions

Since personnel offices generally are located where visitors and prospective employees gain an initial impression of the organization, work areas tend to be modern and pleasant. Personnel specialists usually work a standard 35- to 40-hour workweek. Labor relations specialists, however, may work longer hours—particularly when contract agreements are being prepared and negotiated.

Although most personnel specialists work in the office, some travel extensively. Recruiters regularly attend professional meetings and visit college campuses to interview prospective employees.

Employment

Personnel and labor relations specialists held about 203,000 jobs in 1982. Three out of four jobs were in private industry. Some personnel and labor relations specialists work for labor unions. Others are employed by, or operate, management consulting firms that specialize in such areas as compensation, pensions and benefits, and training and staff development.

Between 45,000 and 55,000 personnel and labor relations specialists worked for Federal, State, and local governments in 1982. They handled recruitment, interviewing, job classification, training, and related matters for the Nation's 16 million public employees: Police officers, firefighters, sanitation workers, teachers, hospital workers, and many others.

Training, Other Qualifications, and Advancement

Because of the diversity of duties and level of responsibility, the educational backgrounds of personnel and labor relations specialists vary considerably. In filling entry level jobs, firms generally seek college graduates. Some employers prefer applicants who have majored in personnel administration or industrial and labor relations, while others look for college graduates with a technical or business background. Still others feel that a well-rounded liberal arts education is best.

Nearly one-half of recent college graduates in personnel and labor relations jobs had majored in business and management, according to a survey conducted by the National Center for Education Statistics (NCES). Others had majored in psychology, sociology, counseling, education, and other disciplines in the social and behavioral sciences. A master's in business administration (M.B.A.) also is suitable preparation. In government, a bachelor's or master's degree in personnel administration, political science, or public administration is an asset.

At least 200 colleges and universities have programs leading to a degree in personnel and labor relations. Other colleges and universities offer programs in personnel administration or personnel management. About 70 colleges and universities offer degree or certificate programs in training and development. Depending on the school, preparation for a career in human resources development may be obtained in departments of business administration, education, instructional technology, organizational development, human services, communication, or public administration.

Because an interdisciplinary background is appropriate for work in this area, a combination of courses in the social sciences, behavioral sciences, business, and economics is useful. Prospective personnel specialists might take courses in principles of management, organization dynamics, and human relations. Other relevant courses include business administration, public administration, psychology, sociology, political science, economics, and statistics. Courses in labor law, collective bargaining, labor economics, labor history, and industrial psychology provide a valuable background for the prospective labor relations specialist.

Graduate study in industrial or labor relations may be required for work in labor relations. A law degree seldom is required for entry level jobs, but many people responsible for contract negotiations are lawyers, and a combination of industrial relations courses and law

A college degree is required for most beginning positions in personnel and labor relations.

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is highly desirable. Some experienced in personnel work move into labor relations.

For many personnel jobs, previous experience is an asset; for some, it is essential. Personnel administration requires the ability to work with individuals as well as a commitment to organizational goals, skills that may be developed in many ways —selling, teaching, supervising, and volunteering, among others. In fact, the majority of personnel and labor relations jobs are filled by people previously employed in another occupation. This field continues to offer clerical workers opportunities for advancement to professional positions. However, more responsible positions may be filled by experienced individuals from other fields including business, government, education, and the military. Social services administration provides a suitable background, too.

Personnel and labor relations specialists should speak and write effectively and be able to work with people of all levels of education and experience as part of a team. They must be patient to cope with conflicting viewpoints and emotionally stable to deal with the unexpected and the unusual. The ability to function under pressure is essential. Integrity, fairmindedness, and a persuasive, congenial personality are important qualities.

Entry level workers usually enter formal or on-the-job training programs where they learn how to classify jobs, interview applicants, or administer employee benefits. Next, they are assigned to specific areas in the personnel department to gain experience. Later, they may advance within their own company, transfer to another employer, or even manage a major element of the personnel program—compensation, training, or EEO/affirmative action, for example.

Workers in the middle ranks of a large organization often leave for a more responsible job in a smaller organization. Exceptional employees may be promoted to director of personnel or labor relations. Others may join a consulting firm or go into private business. A Ph.D. is an asset for teaching, writing, or consulting work.

Job Outlook

The number of personnel and labor relations specialists is expected to grow about as fast as the average for all occupations through the mid-1990's. Most growth will occur in the private sector as employers try to provide effective employee relations programs for an expanding and aging work force. Relatively little growth is anticipated in public personnel administration. As in virtually all occupations, most job openings will result from replacement needs.

Demand for personnel and labor relations specialists is associated with employment conditions in the firms where they work. An expanding business may hire personnel specialists to handle additional paperwork while a business that is reducing its operations will require fewer workers. During recessions, some industries may lay off or reduce the number of personnel and labor relations specialists.

Other factors stimulate demand for personnel and labor relations specialists. Legislation setting standards in occupational safety and health, equal employment opportunity, and pensions has greatly increased recordkeeping and reporting requirements. Continued growth is foreseen as employers review and evaluate programs in these areas.

Corporate recognition of the importance of human resource development will also spur demand. Greater investment in job-specific, employer-sponsored training and retraining is anticipated in the years ahead—a response to productivity concerns, the aging of the workforce, and technological advances that can suddenly leave large numbers of employees with obsolete skills.

Although the number of jobs in this field is projected to increase through the mid-1990's, the job market is likely to remain competitive, particularly in labor relations.

Earnings

Typical entry level jobs in the personnel field include job analyst, EEO representative, benefits analyst, and training specialist. These positions generally require a bachelor's degree but no experience. Salaries vary widely, and depend on the size and location of the firm as well as the nature of its business.

In 1983, according to a survey conducted by the American Society for Personnel Administration and A.S. Hansen, Inc., the median salary for job analysts—sometimes called position analysts, wage analysts or compensation analysts—was $22,000. EEO representatives and training specialists each earned median salaries of $25,500; benefits planning analysts had median salaries of $27,000.

Average annual salaries of personnel directors in private industry ranged from $32,678 to $62,645 in 1983, according to a Bureau of Labor Statistics survey. Top personnel and labor relations executives in large corporations earned considerably more.

In the Federal Government, new graduates with a bachelor's degree generally started at about $13,400 a year in 1982. Those with a master's degree started at about $20,300. Average Federal salaries in several different areas of personnel and labor relations work were as follows in 1982:

Mediators	$45,539
Labor relations specialists	33,134
Apprenticeship and training specialists	33,107
Contractor industrial relations specialists	33,030
Labor-management relations examiners	32,577
Personnel management specialists	30,838
Wage and hour compliance specialists	30,760
Employee development specialists	30,607
Occupational analysis specialists	30,167
Position classifiers	29,281
Employee relations specialists	28,779
Equal employment opportunity specialists	28,686
Salary and wage administrators	28,383
Personnel staffing specialists	27,220

Related Occupations

All personnel and labor relations occupations are closely related. Other workers who help people find jobs or help to make the work environment safe and pleasant include health and regulatory inspectors, occupational safety and health workers, employment counselors, rehabilitation counselors, college career planning and placement counselors, industrial engineers, psychologists, and sociologists. Several of these occupations are described elsewhere in the *Handbook*.

Sources of Additional Information

For general information on careers in personnel and industrial relations, write to:

American Society for Personnel Administration, 606 N. Washington St., Alexandria, VA. 22314.

Accreditation of generalists and specialists in the personnel and human resources field is offered through the Personnel Accreditation Institute. For information, contact:

Executive Director, Personnel Accreditation Institute, 606 N. Washington St., Alexandria, Va. 22314.

For a booklet on *Careers in Training and Development*, contact:

American Society for Training and Development, 600 Maryland Ave. SW., Suite 305, Washington, D.C. 20024.

Brochures describing a career with the National Labor Relations Board as a field examiner or attorney are available from:

Director of Personnel, National Labor Relations Board, 1717 Pennsylvania Ave. NW., Washington, D.C. 20570.

The Industrial Relations Research Association periodically publishes a list of academic programs in industrial relations in the *IRRA Newsletter*. For the current list, contact:

Industrial Relations Research Association, 7226 Social Science Building, 1180 Observatory Dr., Madison, Wis. 53706.

Purchasing Agents

(D.O.T. 162.117-022 and -026; .157-010, -034, and -038; .167-010, -014, and -030)

Nature of the Work

If an organization does not have the right materials, supplies, or equipment when they are needed, its entire production process or work flow could be interrupted or halted. Purchasing agents, also called industrial buyers, see to it that the goods, materials, supplies, and services purchased for internal use by the organization are of suitable quality, sufficient quantity, at the right price, and are available when needed. Agents in industry and the government buy raw materials, machinery, parts and components, furniture, business machines, vehicles, and office supplies. Some, called media buyers, purchase advertising time and space. Buyers who purchase merchandise for resale, rather than for internal use, are described in the statement on buyers, retail and wholesale trade, elsewhere in the *Handbook*.

Purchasing agents buy supplies when the stock on hand reaches a predetermined reorder point, when a department in the organization requisitions items it needs, or when market

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conditions are especially favorable. Because agents often can purchase from many sources, their main job is selecting the supplier who offers the best value consistent with quality, service, and price.

Purchasing agents use a variety of means to choose suppliers. They compare listings in catalogs, directories, and trade journals. They meet with salespersons to discuss items to be purchased, examine samples, and attend demonstrations of products and equipment. Frequently, agents invite suppliers to bid on large orders and then select the lowest bidder among those who meet purchasing and delivery date requirements.

Sometimes purchasing agents negotiate for custom-made products or specialized services. To meet specifications, agents must thoroughly understand the characteristics and functions of these purchases. In some cases, such as computer equipment, this means agents must have considerable technical knowledge. After placing an order, the purchasing agent checks periodically to insure prompt delivery.

Purchasing agents develop good business relationships with suppliers in order to get cost savings, favorable payment terms, quick delivery on emergency orders, or help in obtaining scarce materials. Agents also work closely with other employees in their own organization. For example, they may discuss design of custom-made products with company engineers, defects in purchased goods with quality control technicians, or shipment problems with workers in the shipping department.

Purchasing agents' functions may differ according to the type and size of the organization. In a large firm, agents usually specialize in a commodity or group of commodities—for example, steel, lumber, cotton, or petroleum products. In smaller organizations, agents generally buy a wider range of goods, such as all raw materials or all office supplies, furniture, and business machines. Many have responsibility for arranging custodial, waste disposal, and other contractual services. Purchasing managers usually supervise a group of purchasing agents handling a number of related goods and services.

Working Conditions

Purchasing agents generally work a standard 35- to 40-hour week. Some overtime may be necessary if, for example, the supply of critical materials runs short. Although they spend most of their time in the office, some travel to suppliers, seminars, or trade shows.

Employment

Purchasing agents held about 191,000 jobs in 1982. More than one-half of all the jobs were located in manufacturing, primarily in the machinery and transportation equipment industries. Construction companies, hospitals, schools, and advertising firms also are large employers of purchasing agents. Government agencies, primarily in the Federal sector, provided over one-sixth of all jobs. Because of its complex and extensive purchasing requirements, the Department of Defense employs about 70 percent of all purchasing agents in the Federal Government. Other important Federal employers are the Department of Agriculture, the General Services Administration, and the Veterans Administration.

Many purchasing agents work in organizations that have fewer than five employees in the purchasing department. Large business firms and government agencies, however, have much larger purchasing departments; some employ as many as 100 specialized purchasing agents.

Training, Other Qualifications, and Advancement

Although there are no universal educational requirements for entry level jobs, most large organizations require a college degree and prefer applicants with a master's degree in business administration or management. Companies that manufacture machinery or chemicals may prefer applicants with a technical background, such as engineering or science, while other companies hire business administration majors as trainees. Courses in purchasing, accounting, economics, and statistics are helpful. Familiarity with computers also is desirable. Many colleges and vocational institutes offer courses in purchasing; a few colleges offer a degree in this field.

Some small companies require a bachelor's degree; many others, however, hire graduates of associate degree and vocational education programs in purchasing for entry level jobs. They also may promote clerks or technicians in the purchasing department. Regardless of the size of an organization, however, a college degree is becoming increasingly important for advancement to management positions.

Whatever their educational background, beginning purchasing agents are enrolled in company training programs and spend considerable time learning about company operations and purchasing procedures. They work with experienced buyers to learn about commodities, prices, suppliers, and negotiating techniques. They may be assigned to production planning to learn about the purchasing system, inventory records, and storage facilities.

Junior agents purchase standard and catalog items. As they gain knowledge and experience, they may be promoted to purchasing agent, then to senior purchasing agent. Senior agents purchase highly complex, usually custom-made items.

Purchasing agents must be able to analyze the technical data in suppliers' proposals, make buying decisions, and spend large amounts of money responsibly. The job requires the ability to work independently and a good memory for details. In addition, a purchasing agent must be able to get along well with people to balance the needs of personnel in the organization with budgetary constraints and to negotiate with suppliers. An agent may work with lawyers, contract administrators, and engineers and scientists when involved in complex procurements.

A qualified purchasing agent can become an assistant purchasing manager in charge of a group of purchasing agents and then advance to purchasing manager, director or vice president of purchasing, or director or vice president of materials management. At the top levels, duties may overlap into other management functions such as production, planning, and marketing.

This occupation is becoming increasingly professionalized and specialized. Continuing

Purchasing agents select suppliers who offer the best values.

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education is essential for advancement. Most agents participate in seminars offered by professional societies and take college courses in purchasing. Certification enhances one's chances for top management positions. In private industry, the recognized mark of experience and professional competence is the designation Certified Purchasing Manager (C.P.M.). It is conferred by the National Association of Purchasing Management, Inc., upon candidates who pass four examinations and meet educational and experience requirements. In government, the indications of professional competence are the designations Professional Public Buyer (PPB) and Certified Public Purchasing Officer (CPPO), conferred by the National Institute of Governmental Purchasing, Inc. The PPB is earned by passing a two-part written examination and meeting educational and experience requirements. A candidate must meet more stringent basic requirements and pass a three-part written exam and an interview assessment to earn the CPPO.

Job Outlook

Employment of purchasing agents is expected to increase about as fast as the average for all occupations through the mid-1990's, as the volume of goods and services produced increases. Goods-producing firms will expand purchasing departments to handle the growing complexity of manufacturing processes and to help keep costs of production materials and supplies to a minimum. Many opportunities also should arise as service-producing organizations such as hospitals and schools also recognize the importance of professional purchasers in reducing costs.

Most job openings, however, will continue to arise from the need to replace purchasing agents who leave their jobs. Many workers in this occupation typically transfer to other occupations, often sales or managerial positions. Others retire or leave the labor force for other reasons.

Persons who have a master's degree in business administration and a bachelor's degree in purchasing, or in engineering, science, or business administration with courses in purchasing, should have the best opportunities. Graduates of 2-year programs in purchasing should continue to find good opportunities, especially in small firms.

Earnings

College graduates hired as junior purchasing agents earned about $19,100 a year in 1983. Experienced agents purchasing standard items averaged about $23,600 a year; senior purchasing agents specializing in complex or technical goods averaged about $29,000. Assistant purchasing managers received average salaries of about $35,600 a year. Many corporate directors of purchasing or materials management earned well over $50,000 a year. Salaries generally are higher in large firms where responsibilities often are greater.

In the Federal Government, beginning purchasing agents who had college degrees earned $13,000 or $16,100 in 1982, depending on scholastic achievement and experience. Among State governments, earnings ranged from $11,000 for beginning purchasing agents to over $40,000 for chiefs of purchasing. Generally, local governments' salaries are somewhat lower. However, salaries in some major metropolitan areas surpass their State government counterparts.

Related Occupations

Other workers who negotiate and contract to purchase equipment, supplies, or other merchandise include retail and wholesale buyers, procurement services managers, livestock commission agents, and traffic managers.

Sources of Additional Information

Further information about careers in purchasing is available from:

National Association of Purchasing Management, Inc., 496 Kinderkamack Road, Oradell, N.J. 07649.

National Institute of Governmental Purchasing, Inc., 115 Hillwood Ave., Falls Church, Va. 22046.

School Administrators

(D.O.T. 091.107-010, 099.117-018, -022, and -030)

Nature of the Work

School administrators provide the leadership and managerial ability that keep individual schools and entire school systems running smoothly. School administrators include school district superintendents, assistant superintendents, and assistant principals. The jobs vary greatly, and most of what follows primarily concerns those in the public school system.

The task of school administrators has grown more complex in recent years. Not only are schools and school systems larger than ever before—the result of a continuing trend toward consolidation—but they touch the lives of many people, some of whom have become increasingly vocal, even angry, in pursuing their goals. It takes political as well as administrative skill to handle the issues that confront school leaders today: Quality education, desegregation, contract negotiations with teachers, spiraling costs, and taxpayer resistance to higher taxes, to name a few. But, as educators, administrators have the satisfaction of knowing that their work smooths the way to knowledge for their schools' students.

The job of a school administrator begins with planning and setting goals. To achieve these goals, administrators must organize, coordinate, direct, and evaluate the activities of school personnel, ensuring that they meet deadlines and keep to their budgets. Administrators, acting on behalf of the school board, negotiate contracts and settle labor disputes. They must also maintain good relations with the public.

Superintendents, the chief administrators of a school district, oversee and coordinate the activities of all the schools in the district. The board of education selects the superintendent, whose duties range from routine administrative tasks to long-range planning. The nature of the job depends in part on the size of the district. Managing the public schools in Raynham, Massachusetts, is not quite the same as running the public schools in Chicago. Nevertheless, the kind of work performed by the superintendent is essentially the same in every district.

On any given day, a superintendent may supervise the preparation of a budget; participate in collective bargaining sessions with employees; meet with parents, teachers, or local citizens' groups; plan for changes in physical facilities or staff size due to changes in enrollment; write reports to the school board; or issue directives pertaining to the operation of the school system.

Most superintendents have one or more deputies or assistants. An assistant superintendent's duties depend on the size and organization of the school system. In some districts, assistant superintendents oversee all the operations in a particular geographic area; in others, they have authority over specific activities—personnel, budget, or instruction and pupil services, for example.

Principals are the highest authority in a school. They are responsible for running the school according to the standards set by the superintendent and board of education.

Ensuring high-quality instruction is the principal's most important responsibility. Principals visit classrooms, review instructional objectives, evaluate teachers, and examine learning materials. They also spend a great deal of time doing paperwork: Filling out forms, preparing administrative reports, keeping track of attendance, seeing that supplies are properly requisitioned and allocated, and so on. Despite the paperwork, principals spend much of the day with people. They confer with teachers and other staff—advising, explaining, or answering procedural questions; they meet with students; and they talk with parents and members of the community.

In larger schools, assistant principals often handle the discipline and coordinate social and recreation programs. Assistant principals may also provide individual or group counseling about personal, social, educational, or vocational matters.

Working Conditions

School administrators work mainly in their offices, but they spend some time away from their desks at meetings with parent and teacher associations, the school board, and civic groups; sitting in on classes; attending school assemblies and sports events; and checking school physical facilities.

School superintendents and principals usually work a standard 40-hour week. However, at night and on weekends, they often put in extra hours at meetings or attending to problems that require immediate attention. Unlike teachers, administrators work year round and can usually be found at their desks even during school vacations.

Employment

Elementary and secondary school administrators held about 133,000 jobs in 1982, most

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of them in public school systems. School systems have at least one superintendent and, generally, one or more assistant superintendents. Every school has a principal, and larger schools may have one or more assistant principals. Assistant principals are generally employed in secondary schools, which tend to be larger than elementary schools.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require certification of school administrators. Certification requirements may include good health and character, U.S. citizenship or State residency, graduate training in educational administration, teaching experience, and passing an examination. Information on specific requirements may be obtained from State departments of education.

School superintendents usually are experienced administrators. Many are former principals who worked their way up through the administrative hierarchy. Principals and assistant principals are required by most school systems to have several years of experience as classroom teachers. Teachers with varying backgrounds sometimes move directly into principalships. Experience in organizing and supervising school programs and activities is also an important qualification for principals and assistant principals, who may have had another administrative job—such as curriculum specialist; financial advisor; or director of audiovisual aids, arts, or special education.

Graduate study in educational administration, preferably at the doctoral level, is usually required for a school district superintendent. Larger districts may expect candidates for positions in the central administrative office to have a law or business degree in addition to a graduate degree in education. A master's degree in educational administration is the usual prerequisite for a position as a school principal or assistant principal.

The National Council for Accreditation of Teacher Education accredits graduate programs in educational administration on over 250 campuses. Programs provide specific preparation for elementary school principals, secondary school principals, or school district superintendents. Educational administration courses include school management, school law, school finance and budgeting, curriculum development and evaluation, systematic planning, supervision of instruction, research design and data analysis, personnel administration, community relations, politics in education, and leadership. A semester of internship and field experience is recommended.

In addition to experience and education, school administrators need certain personal characteristics. Leadership skills and managerial ability are needed to direct the activities of the many people employed in a school or school system. Administrators need a personal philosophy of education which includes an understanding of the educational process and its goals, as well as familiarity with educational technology, curriculum development, and strategies for meeting educational needs. Because their duties may be rather loosely defined, school administrators must also have a strong sense of direction and motivation. Moreover, they are frequently under fire from many groups. Therefore, self-confidence and the ability to withstand criticism are essential, as are tact and communications skills.

When hiring administrators, most school systems consider only experienced teachers.

Because administrative competence is so important for a school administrator, an applicant's past work record and reputation are extremely important when hiring decisions are made.

Job Outlook

Employment of school administrators is expected to grow more slowly than the average for all occupations through the mid-1990's. Most job openings will be to replace administrators who leave the profession.

Pupil enrollment is the basic factor underlying the demand for school administrators. Elementary school enrollments are expected to start rising again in 1985 and to continue to rise through 1995; secondary school enrollments are not expected to start growing again until after 1990, however. Therefore, employment of elementary school principals is expected to increase after 1985 and secondary school principals, after 1990. Employment of superintendents, which is determined by the number of districts rather than by enrollments, is not expected to increase.

Although openings for principals are expected to increase, competition for school administrator jobs may continue through the mid-1990's. Large numbers of teachers and other school personnel obtain graduate degrees in education or educational administration each year. Many of these—whether prompted by "burnout" or dissatisfaction with the classroom environment, or attracted by the wider range of duties, greater responsibilities, and higher salaries—can be expected to compete for administrative positions.

Also, consolidation of both school districts and schools is expected to continue for at least a while longer. Thus some positions may be abolished. However, while some administrative positions may be lost, others—particularly for assistants—are expected to be created as a result of the increased size and complexity of the consolidated units.

Earnings

Salaries of school administrators vary according to position, level of responsibility, and the size and geographic location of the school or school district. Salaries increase with the size of the school or district. In general, salaries are highest in the Far West and Mid-Atlantic States and lowest in the Southeast. According to the Educational Research Service, Inc., average salaries for selected school administrators in 1982-83 were as follows:

Superintendents (contract salary)	$50,260
Deputy/associate superintendents	47,404
Assistant superintendents	42,194
Principals:	
Senior high school	37,602
Junior high/middle school	34,966
Elementary school	32,451
Assistant principals:	
Senior high school	31,252
Junior high/middle school	29,746
Elementary School	27,419

Related Occupations

School administrators need organizational and leadership skills to manage people, programs,

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and financial resources successfully. The same combination of professional competence and managerial effectiveness is needed for administrative positions in health, welfare, religion, and recreation. Related occupations include hospital administrators, academic deans, directors of agencies on aging, library directors, college or university department heads, recreation and park directors, and museum curators.

Sources of Additional Information

For information about careers in school administration, contact:

American Association of School Administrators, 1801 North Moore St., Arlington, Va. 22209.

The National Association of Secondary School Principals, 1904 Association Drive, Reston, Virginia 22091.

Underwriters

(D.O.T. 169.167-058)

Nature of the Work

Insurance companies assume billions of dollars in risks each year by transferring the risk of loss from their policyholders to themselves. Underwriters appraise and select the risks their company will insure. The underwriter must analyze information in insurance applications, reports from loss control consultants, medical reports, and actuarial studies (reports that describe the probability of insured loss) and then decide whether to issue a policy. An insurance company may lose business to competitors if the underwriter appraises risks too conservatively or it may have to pay more claims if the underwriting actions are too liberal. (The term underwriter sometimes is used in referring to insurance agents; see the statement on insurance agents and brokers elsewhere in the *Handbook* for a discussion of that occupation).

When deciding that an applicant 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 managers about policy cancellations or other requests for information. In addition, they sometimes accompany salespeople on appointments with prospective customers.

Most underwriters specialize in one of three major categories of insurance: Life, property and liability, or health. They further specialize in group or individual policies. The property and liability underwriter specializes by type of risk insured, such as fire, automobile, marine, or workers' compensation. In cases where casualty companies insure in a single "package" policy, covering various types of risks, the underwriter must be familiar with different lines of insurance. Some underwriters, called commercial account underwriters, handle business insurance exclusively. They often evaluate a firm's entire operation in appraising its insurance application.

An increasing proportion of insurance sales are being made through group contracts. A standard group policy insures all persons in a specified group through a single contract at uniform premium rates, generally for life or health insurance protection. The group underwriter analyzes the overall composition of the group to be sure that the total risk is not excessive. Another type of group policy provides members of a group—a labor union, for example—with individual policies reflecting their individual needs. These generally are casualty policies, such as those covering automobiles. The casualty underwriter analyzes the application of each group member and makes individual appraisals. Some group underwriters meet with union or employer representatives to discuss the types of policies available to their group.

Underwriters appraise' risk by carefully reviewing relevant reports.

Working Conditions

Underwriters have desk jobs that require no unusual physical activity. Their offices generally are comfortable and pleasant. Although some overtime may be required, the normal workweek is 35-40 hours. Underwriters occasionally may attend meetings away from home for several days.

Employment

Insurance underwriters held about 76,000 jobs in 1982. Most life insurance underwriters were in home offices in a few large cities, such as New York, San Francisco, Chicago, Dallas, Philadelphia, and Hartford.

Training, Other Qualifications, and Advancement

For beginning underwriting jobs, most large insurance companies seek college graduates who have a degree in liberal arts or business administration, but a major in almost any field provides a good general background. Some small companies hire persons without a college degree for underwriter trainee positions. In addition, some high school graduates who begin as underwriting clerks may be trained as underwriters after they demonstrate an aptitude for the work.

Underwriter trainees begin by evaluating routine applications under the close supervision of an experienced risk appraiser. They study claim files to become familiar with factors associated with certain types of losses. As they develop the necessary judgment, they are assigned policy applications that are more complex and have a greater face value.

Continuing education is necessary for the underwriter to advance. Insurance companies generally pay tuition for underwriting courses that their trainees successfully complete; some also offer salary increases. Independent study programs are available through the American Institute of Property and Liability Underwriters, the American College of Life Underwriters, the Academy of Life Underwriters, the Health Insurance Association of America, the Insurance Institute of America, and the Life Office Management Association. Experienced underwriters can qualify as a "fellow" of the Academy of Life Underwriters by passing a series of examinations and completing a paper on a topic in the underwriting field. Examinations are given by the Institute of Home Office Underwriters and the Home Office Life Underwriters Association. Designation as a "fellow" is recognized as a mark of achievement in the underwriting field.

Underwriting can be a satisfying career for persons who like working with detail and enjoy evaluating information. In addition, underwriters must be able to make prompt decisions and communicate effectively. They must also be imaginative and aggressive, especially when they have to get information from outside sources.

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

Job Outlook

Employment of underwriters is expected to rise about as fast as the average for all occupations through the mid-1990's as insurance sales continue to expand. Most job openings, however, are expected to result from the need to replace underwriters who transfer to other occupations, retire, die, or stop working for other reasons.

Several factors underlie the expected growth in the volume of insurance and the resulting need for underwriters. Over the next decade, many more workers will enter the 25-54 age group. People in this age group have the greatest need for life and health insurance. They also need protection for homes, automobiles, and other valuables. A growing demand for insurance coverage for working women is also expected. Growing security- consciousness should also contribute to demand for more insurance protection. New or expanding businesses will need protection for new plants and equipment, insurance for workers' compensation, product liability, and mandatory insurance against long-term gradual environmental damage caused by hazardous waste. Competition among insurance companies and changes in regulations affecting investment profits also are expected to increase the need for underwriters.

Since insurance is usually regarded as a necessity regardless of economic conditions, underwriters are unlikely to be laid off during a recession.

Earnings

According to a survey of property and liability insurance companies, personal lines underwriters earned a median salary of $18,500 a year in 1982. Those specializing in surety bonds earned $21,000. Senior personal lines underwriters received a median salary of $23,400, while senior commercial lines underwriters earned $23,700 a year. Underwriting supervisors in property and liability companies earned between $26,500 and $28,000 a year in 1982.

Most insurance companies have liberal vacation policies and other employee benefits. Almost all insurance companies provide employer-financed group life and retirement plans.

Related Occupations

Underwriters make decisions on the basis of financial data. Other workers with the same type of responsibility include auditors, loan officers, credit managers, and real estate appraisers.

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:

American Council of Life Insurance, 1850 K St. NW., Washington, D.C. 20006.

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

Alliance of American Insurers, 20 N. Wacker Dr., Chicago, Ill. 60606.

The National Association of Independent Insurers, Public Relations Department, 2600 River Rd., Des Plaines, Ill. 60018.

OTHER ADMINISTRATIVE AND MANAGERIAL OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Assessors	Appraise real and personal property to determine its fair value and assess taxes in accordance with prescribed schedules.	28,000	More slowly than average
Claims takers, unemployment benefits	Interview unemployed workers and compile data to determine eligibility for unemployment benefits.	15,000	Little change is expected
Cost estimators	Prepare cost and work completion estimates for engineering contract bids. Compute cost estimates of raw materials, purchased equipment, or subcontracted work and labor.	92,000	Faster than average
Credit analysts	Analyze credit data to estimate degree of risk involved in extending credit or lending money to firms or individuals, and prepare reports of findings.	22,000	Faster than average
Credit analysts, chief	Analyze fiscal data such as financial statements, to develop, write and update credit information used to review bank's credit relationship with customers.	8,700	Faster than average
Postmasters and mail superintendents	Supervise and coordinate activities of workers engaged in postal and related work in assigned post office.	28,000	Expected to decline
Special agents, insurance	Recruit independent insurance agents in field and maintain contact between them and home office. Advise agents on matters pertaining to conduct of business, such as cancellations, overdue accounts, technical problems, claims procedures, new business contacts and new products. May gather information for underwriter. May inspect buildings to determine fire insurance rates.	31,000	Faster than average
Tax examiners, collectors and revenue agents	Collect taxes from individuals or business firms according to prescribed laws and regulations.	47,000	More slowly than average

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Engineers, Surveyors, and Architects

Nature of the Work

Engineers, surveyors, and architects do planning and design. Engineers design machines, processes, systems, and structures. Surveyors measure and lay out land boundaries. Architects design buildings and other structures, as well as outdoor areas. Architects, engineers, and surveyors often work together on building projects. Architects design the building, concentrating on the visual appearance as well as the needs of owners and occupants. Engineers design those parts of the building which are concerned with such things as its mechanical, heating, and electrical systems. Surveyors lay out the building's boundaries and the boundaries of the land it occupies.

Engineers apply scientific and mathematical theories and principles to solve practical technical problems. Most work in one of the more than 25 specialties recognized by professional societies. Electrical, mechanical, civil, chemical, and aerospace engineering are the largest. Although many engineers design and develop technical products and systems, others work in testing, production, operations, and maintenance.

Architects also apply scientific and mathematical theories and principles to design and construct buildings which are esthetically appealing and safe, and which meet the needs of their client.

Surveyors use mathematical and scientific principles to measure and lay out land areas and establish boundaries. They also research deeds, write legal descriptions of land, and collect information for maps and charts.

Training, Other Qualifications, and Advancement

The generally accepted standard for engineers is a bachelor's degree in engineering, although those with degrees in natural science or mathematics may sometimes qualify as engineers. Surveyors usually qualify for their work with a combination of postsecondary school courses and on-the-job training. Some obtain a junior college degree in surveying. A bachelor's degree in architecture is necessary to become an architect. To offer architectural services to the public, architecture graduates must have several years' work experience and pass a licensing examination.

Job Outlook

All occupations in this group are expected to grow as fast as or faster than the average for all occupations through the mid-1990's. In architecture, however, growth may not be rapid enough to provide jobs for all of those seeking to enter the occupation.

Architects

(D.O.T. 001.061-010, -014 and .167-010)

Nature of the Work

Designing a building involves far more than planning an attractive exterior made of stone, steel and glass, or other materials. Buildings must be safe as well as attractive and suit the needs of the people who use them. Architects take all these things into consideration and design buildings that are esthetically appealing, safe, and functional.

Architects provide a wide variety of professional services to individuals and organizations planning a building project. Architects are involved in all phases of development, from the initial discussion of general ideas with the client through construction. Their duties require a variety of skills—design, engineering, managerial, and supervisory.

The architect and client first discuss the purposes, requirements, and cost of a project. Based on the discussions, the architect prepares a program—a report specifying the requirements the design must meet. The architect then prepares carefully scaled drawings presenting ideas for meeting the client's needs.

After the architect's initial proposals are discussed and accepted, the architect develops final construction documents that incorporate any changes required by the client. These documents show the floor plans, elevations, building sections, and other construction details of the project. Accompanying the architectural drawings are drawings of the structural system, air-conditioning, heating, and ventilating systems, electrical systems, plumbing, and landscape plans.

Architects also specify the building materials and, in some cases, the interior furnishings. In all cases, the architect's design and specifications must conform to local and State building codes, zoning laws, fire regulations, and other ordinances, such as those that require easy access by handicapped persons.

Throughout the planning stage, the architect may make changes to satisfy the client. A client may decide that the design is too expensive and ask the architect to make modifications, or the client may propose additions to the original plan. Redesigning to suit the client requires flexibility, and sometimes considerable patience, on the part of the architect.

After all drawings are completed, the architect assists the client in selecting a contractor and negotiating the construction contract. As construction proceeds, the architect visits the building site to monitor the contractor in following the design and using the specified materials. The architect also checks to be sure that the quality of work meets the specified standards. The job is not complete until construction is finished, all required tests are made, construction costs are paid, 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 multibuilding 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 conducting long-range planning for land development.

When working on large projects or for large architectural firms, architects often specialize in one phase of the work, such as designing or administering construction contracts. This often requires working with engineers, urban planners, landscape architects, and others.

Working Conditions

Architects generally work in a comfortable environment. Most of their time is spent in offices interviewing clients, developing reports and drawings, and working with other architects and engineers. However, they also often work at the construction site inspecting the progress of the project.

Architects may work under great stress to meet deadlines and working nights and weekends is not uncommon.

Employment

Architects held about 84,000 jobs in 1982. Most architects work for architectural firms—many of which employ fewer than five workers. The remainder work for builders, real estate developers, or other businesses that have large construction programs and for government agencies responsible for housing, planning, or community development such as the Departments of Defense, Interior, and Housing and Urban Development.

A large proportion of architects are located in New York, Chicago, Los Angeles, Boston, and Washington where many large architectural firms are located. Increasing numbers of architects are finding employment in areas of the South and Southwest that are attracting new business and residential construction such as Dallas-Ft. Worth, Phoenix, and a number of Florida cities.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require individuals to be registered (licensed) before they may call themselves architects or contract for providing architectural services. To qualify

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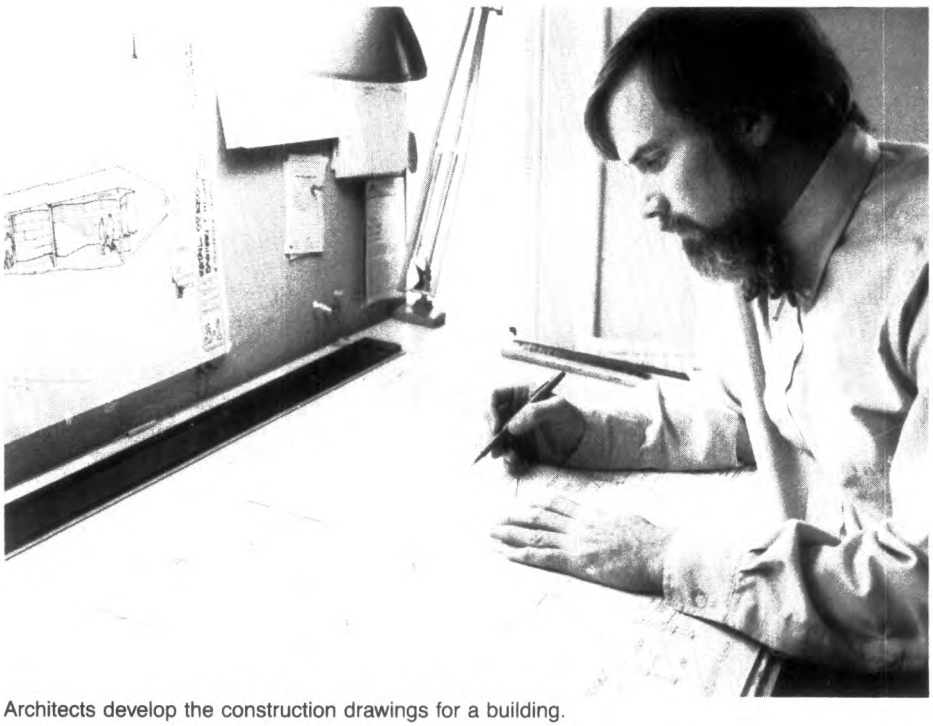

Architects develop the construction drawings for a building.

for the registration examination, a person generally must have at least a Bachelor of Architecture degree from a program accredited by the National Architectural Accrediting Board and three years of acceptable experience in an architect's office. As a substitute for the professional degree in architecture many States accept other combinations of formal education and experience (usually much more than 3 years) for admission to the registration examination. Many architecture school graduates work in the field even though they are not registered. However, a registered architect is required to take legal responsibility for all work.

In 1982, the National Architectural Accrediting Board had accredited the programs of 92 schools offering professional degrees in architecture. Most of these schools offer either a 5-year curriculum leading to a Bachelor of Architecture degree or a 6-year curriculum leading to a Master of Architecture degree. Students also may transfer to professional degree programs after completing a 2-year junior or community college program in architecture. Many architecture schools also offer graduate education for those who already have their first professional degree. Although such graduate education is not essential for practicing architects, it is desirable for those engaged in specialties or in research and teaching. A typical college architecture program includes courses in architectural theory, design, graphics, engineering, and urban planning, as well as in English, mathematics, physics, economics, and the humanities.

Persons planning a career in architecture should be able to work independently, have a capacity for solving technical problems, and be artistically inclined. They also must be prepared to work in the competitive environment of business where leadership and ability to work with others are important. Students who work for architects, engineers, or building contractors during summer vacations can gain useful experience.

New graduates usually begin in architectural firms, where they prepare architectural drawings and make models of structures under the direction of a registered architect. They also may design; administer construction contracts; or write specifications for building materials, the method of installation, the quality of finishes, and many other related details.

In large firms, architects may move to supervisory or managerial positions. Some architects become partners in established firms. Often, however, the architect's goal is to own his or her own business.

Job Outlook

Employment of architects is expected to rise faster than the average for all occupations through the mid-1990's. Demand for architects is highly dependent upon the level of construction in the United States and foreign countries. As building activity increases, demand for architectural services also will rise. Employment growth, however, is not expected to be as fast as in previous years. The increasing use of computer technologies, such as computer-aided design will increase the amount of work architects can undertake. In addition, foreign demand for U.S. architectural services may grow more slowly than in the past as countries that traditionally have hired American firms develop their own architectural service.

About half of all job openings will result from replacement needs, a much smaller proportion than for all professional workers. The number of job openings for architects is small in comparison to other occupations because the occupation is small and few architects leave the field because they have made a large investment in their training.

Although employment is expected to rise faster than the average, supply in this small field could exceed the number of job openings arising from growth in demand for architects and from replacement needs. Competition will continue to be keen for jobs in the most prestigious firms which offer good potential for career advancement.

Earnings

The median annual earnings for salaried architects who work full time were about $23,900 in 1982. Most earned between $18,000 and $31,000. The top 10 percent earned more than $40,000 and the lowest 10 percent less than $13,000.

The average salary for experienced architects in 1982 was about $21,000 a year, according to the American Institute of Architects. Newly hired architects received about $12,000 annually to start and their salaries increase as they work toward passing the registration examination.

Architects with well-established private practices generally earn much more than even highly paid salaried employees of architectural firms. However, architects may have difficulty getting established in their own practices and may go through a period when their expenses are greater than their income. Annual income may fluctuate due to changing business conditions.

In 1982, the average salary for architects working in the Federal Government was about $33,000.

Related Occupations

Architects are concerned with the design and construction of buildings and related structures. Others who engage in related work are building contractors, civil engineers, urban planners, interior designers, industrial designers, landscape architects, drafters, and surveyors.

Sources of Additional Information

General information about careers in architecture, including a catalog of publications, can be obtained from:

The American Institute of Architects, 1735 New York Ave. NW., Washington, D.C. 20006.

Specific questions on education careers should be addressed to:

The Association of Collegiate Schools of Architecture, Inc., 1735 New York Ave. NW., Washington, D.C. 20006.

Information about the licensing examinations can be obtained from:

The National Council of Architectural Registration Boards, 1735 New York Ave. NW., Suite 700, Washington, D.C. 20006.

Surveyors

(D.O.T. 018.167-010, -014, -018, -026 and -034 through -050, .261-018, -022, and -026, and .262-010)

Nature of the Work

Surveyors establish official land boundaries, write descriptions of land to satisfy legal requirements, help set land valuations, measure

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construction and mineral sites, and collect information for maps and charts.

Surveys are usually conducted by a survey party to measure distances, directions, and angles between points and elevations of points, lines, and contours on the earth's surface. *Land surveyors*, who may head one or more survey parties, are directly responsible for a party's activities and the accuracy of its work. They plan the fieldwork, select survey reference points, and determine the precise location of natural and constructed features of the survey project area. They record the results of the survey, verify the accuracy of data, and prepare sketches, maps, and reports.

A typical survey party is made up of the *party chief* and one to six assistants and helpers. The party chief leads the day-to-day work activities of the party. *Instrument assistants* adjust and operate surveying instruments such as the theodolite (used to measure horizontal and vertical angles) and electronic equipment used to measure distances. These workers also compile notes, sketches, and records of the data obtained from using these instruments.

Surveyors may specialize in a particular type of survey. Many do land surveys to locate boundaries of a particular tract of land. They then prepare maps and legal descriptions for deeds, leases, and other documents. Those doing topographic surveys determine elevations, depressions, and contours of an area, and indicate distinguishing surface features such as farms, buildings, forests, roads, and rivers. *Geodetic surveyors* use special high-accuracy techniques, such as satellite observations, to measure large areas of the earth's surface. *Geophysical prospecting surveyors* mark sites for subsurface exploration, usually petroleum related. *Marine surveyors* survey harbors, rivers, and other bodies of water to determine shorelines, topography of the bottom, depth, and other features.

Photogrammetrists measure and interpret photographic images to determine the various physical characteristics of natural or constructed features of an area. By applying analytical processes and mathematical techniques to photographs from aerial, space, ground, and underwater locations, photogrammetrists are able to make detailed maps of areas that are inaccessible or difficult to survey by other methods. Control surveys on the ground are made to insure the accuracy of maps derived from photogrammetric techniques. *Mosaicists* and *map editors* help develop and verify maps and pictures from aerial photographs.

A closely related occupation that uses surveying techniques is geodesist. (The work of geodesists is described in the statement on geologists elsewhere in the *Handbook*.)

Working Conditions

Surveyors usually work an 8-hour day 5 days a week. Sometimes they work longer hours during the summer months when weather conditions are most suitable for surveying.

The work of a survey party is active and sometimes strenuous. Party members often stand for long periods and walk long distances or climb hills with heavy packs of instruments and equipment. They also are exposed to all types of weather. Occasionally, they must commute long distances or find temporary housing near the survey site.

Surveyors spend considerable time on office duties, such as planning surveys, preparing reports and computations, and drawing maps. Most computations and some map drafting are done by computer.

Employment

Surveyors held about 40,000 jobs in 1982. This is about 12,000 fewer than in 1980, reflecting the severe decline in construction activity during the 1981-82 recession. Engineering and architectural consulting firms employ nearly one-half of all surveyors. Federal, State, and local government agencies employ about one-fourth. Among the Federal Government agencies employing surveyors are the U.S. Geological Survey, the Bureau of Land Management, the Army Corps of Engineers, the Forest Service, the National Ocean Survey, and the Defense Mapping Agency. Most surveyors in State and local government agencies work for highway departments and urban planning and redevelopment agencies. Construction firms, oil and gas extraction companies, and public utilities also employ surveyors. In addition, a sizable number own their own survey firms.

Training, Other Qualifications, and Advancement

Most persons prepare for surveying work by combining postsecondary school courses in surveying with extensive on-the-job training. Some prepare by obtaining a college degree. Junior and community colleges, technical institutes, and vocational schools offer 1-, 2-, and 3-year programs in surveying. A few 4-year colleges offer bachelor's degrees specifically in surveying, while many others offer several courses in the field.

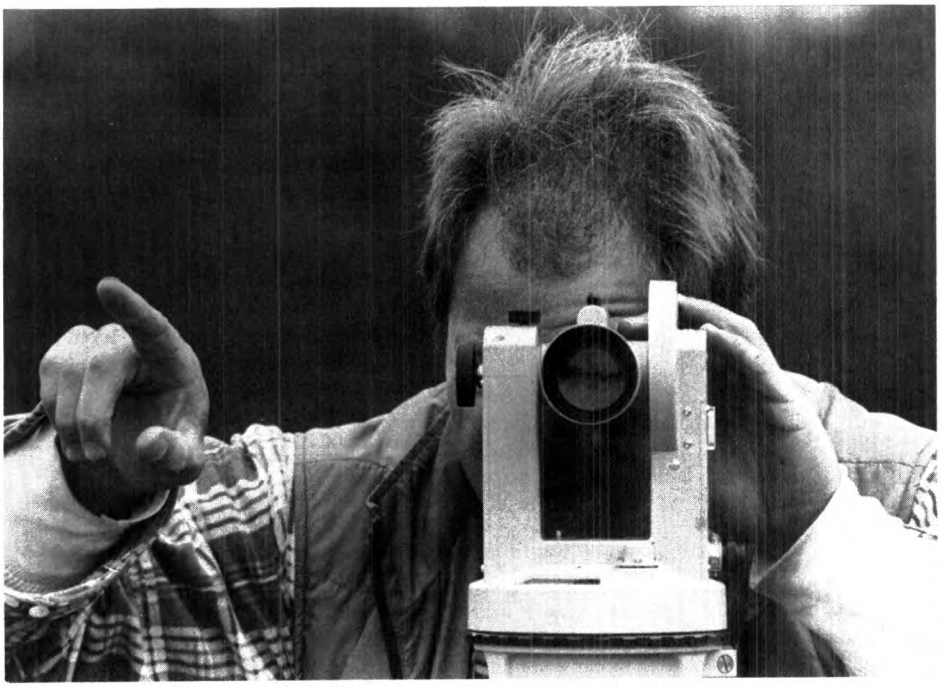
High school students interested in pursuing a career in surveying should take courses in algebra, geometry, trigonometry, drafting, mechanical drawing, and computer science.

High school graduates with no formal training in surveying usually start as a member of the survey crew. After several years of on-the-job experience and formal training in surveying—either in an institutional program or from a correspondence school—workers may advance to instrument assistant, then to party chief, and finally to licensed surveyor.

Beginners with postsecondary school training in surveying can generally start as instrument assistants. After gaining experience, they may advance to party chief or become a licensed surveyor. In many instances, promotions to higher level positions are based on written examinations as well as experience.

Those interested in a career as a photogrammetrist usually need a bachelor's degree in engineering or a physical science. Most photogrammetry technicians have had some specialized postsecondary school training.

All 50 States require licensing of land surveyors. Licensing requirements are generally quite strict because, once licensed, surveyors can be held legally responsible for their work. Requirements for licensure vary among the States. Generally, the quickest route to licensure is a combination of 4 years of college, 2 to 4 years of experience, and passing the State licensing exam. In most States, persons may qualify to take the licensing exam after 5 to 12 years of surveying experience. As a prerequisite to licensure, some States now require a bachelor's degree in surveying or in a closely related field such as civil engineering or forestry with courses in surveying. A few States allow such graduates to take the licensing examination without experience in the field.



Surveyors work as members of a team when conducting field surveys.

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Surveyors should have the ability to visualize and understand objects, distances, sizes, and other abstract forms. Also, because mistakes can be very costly, surveyors must make mathematical calculations quickly and accurately while paying close attention to the smallest detail. Leadership qualities are important for surveyors who supervise others.

Members of a survey party must be in good physical condition to work outdoors and carry equipment over difficult terrain. They also need good eyesight, coordination, and hearing to communicate over great distances by hand or voice signals.

Job Outlook

Employment of surveyors is expected to grow faster than the average for all occupations through the mid-1990's. In addition to openings arising from growth in the demand for these workers, many will result from the need to replace those who leave the occupation, retire, or die.

In the long run, the anticipated growth in construction should create additional jobs for surveyors who lay out streets, shopping centers, housing developments, factories, office buildings, and recreation areas. Construction and improvement of the Nation's roads and highways also should create new surveying positions. However, employment may fluctuate from year to year because construction activity is highly sensitive to changes in economic conditions.

There are indications that demand for surveyors is becoming somewhat less dependent on the level of construction activity. Technological innovations that utilize satellites to collect data have opened new areas of specialization. For example, the ability to map inaccessible areas of the earth has been greatly expanded on both land and sea.

Earnings

In 1982, high school graduates with little or no training or experience earned about $9,800 annually at entry level jobs on survey crews with the Federal Government. Those with 1 year of related postsecondary training earned $10,650. Those with an associate degree that included courses in surveying generally started as instrument assistants with an annual salary of $11,950. The average annual salary for surveying technicians in 1982 was $15,020. In early 1983, persons starting as land surveyors with the Federal Government earned $13,400 or $16,600 a year, depending on their qualifications. The average annual salary for land surveyors in 1982 was $26,240.

Although salaries in private industry vary by geographic area, limited information indicates that salaries for surveyors or surveying technicians are generally comparable to those in the Federal service at any given level.

Related Occupations

Other occupations concerned with accurate measurement and delineation of land areas, coastlines, and natural and constructed features include cartographers, cartographic drafters, geodesists, and topographical drafters.

Sources of Additional Information

Information about career opportunities, licensure requirements, and schools that offer training in surveying is available from:

American Congress on Surveying and Mapping, 210 Little Falls St., Falls Church, Va. 22046.

General information on careers in photogrammetry is available from:

American Society of Photogrammetry, 210 Little Falls St., Falls Church, Va. 22046.

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Engineers

The work of engineers has made it possible to communicate by telephone, radio, and TV; to travel in space; and to prolong life. Future accomplishments could be increased energy supplies, more pollution-free powerplants, and aid to medical science in its fight against disease.

This section, which contains an overall discussion of engineering, is followed by separate statements on ten branches of the profession—aerospace, chemical, civil, electrical, industrial, mechanical, metallurgical, mining, nuclear, and petroleum engineering.

Nature of the Work

Engineers apply the theories and principles of science and mathematics to practical technical problems. Often their work is the link between a scientific discovery and its application. Engineers design machinery, products, systems, and processes for efficient and economical performance. They develop electric power, water supply, and waste disposal systems. They design industrial machinery and equipment for manufacturing 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; design defense and weapons systems for the Armed Forces; 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, refrigerators, and electronic games, and systems for control and automation of manufacturing, business, and management processes.

Engineers must consider many factors in developing a new product. For example, in developing devices to reduce automobile exhaust emissions, engineers must determine the general way the device will work, design and test all components, and fit them together in an integrated plan. They must then evaluate the overall effectiveness, cost, reliability, and safety of the new device. This process applies to products as different as lawnmowers, computers, industrial machinery, and toys.

In addition to design and development, many engineers work in testing, production, operations, or maintenance. They supervise production processes in factories, determine the causes of breakdowns, and test newly manufactured products to maintain quality. They also estimate the time and cost to complete projects. Some work in engineering administration and management, or in sales jobs where an engineering background enables them to discuss the technical aspects of a product and assist in planning its installation or use. (See the statement on manufacturers' sales workers elsewhere in the *Handbook*.) Some engineers work as consultants.

Most engineers specialize; more than 25 specialties are recognized by professional societies. Within the major branches are over 85 subdivisions. Structural, hydraulic, and highway engineering, for example, are subdivisions of civil engineering. Engineers also may specialize in one industry, such as motor vehicles, or in one field of technology, such as propulsion or guidance systems.

Engineers in each branch apply their knowledge to many fields. Electrical engineers, for example, work in the medical, computer, missile guidance, or power distribution fields. Because complex problems cut across traditional fields, engineers in one field often work closely with specialists in scientific, other engineering, and business occupations.

Engineers often use calculators and computers to solve mathematical equations which describe how a machine, structure, or system operates. Engineers also spend a great deal of time writing reports and consulting with other engineers. Complex projects require many engineers, each working with a small part of the job. Supervisory engineers are responsible for entire projects.

Working Conditions

Some engineers are at a desk in an office building almost all of the time but others work in research laboratories, industrial plants, or construction sites to inspect, supervise or solve on-site problems. Engineers in specialties such as civil engineering may work outdoors part of the time. A few engineers travel extensively to plants or construction sites. Some work overtime to meet deadlines, often without additional compensation.

Employment

Engineering is the second largest profession, exceeded only by teaching. In 1982, engineers held about 1,204,000. About 600,000 or one-half of all engineering jobs were located in manufacturing industries—mostly in electrical and electronic equipment, aircraft and parts, machinery, chemicals, scientific instruments, primary metals, fabricated metal products, and motor vehicle industries. In 1982, over 400,000 jobs were in nonmanufacturing industries, primarily in engineering and architectural services, construction, public utilities, and business and management consulting services.

Federal, State, and local governments employed about 160,000 engineers. Over half of the jobs were in the Federal Government, mainly in the Departments of Defense, Interior, Energy, Agriculture, and Transportation, and in the National Aeronautics and Space Administration. Most engineers in State and local government agencies worked in highway and public works departments.

Besides the jobs described above, about 40,000 persons held engineering faculty positions in colleges and universities in 1982. (See the statement on college and university faculty elsewhere in the *Handbook*.)

Engineers are employed in every State, in small and large cities, and in rural areas. Some branches of engineering are concentrated in particular industries and geographic areas, as discussed in statements later in this chapter.

Electrical engineering is the largest engineering specialty.

SOURCE: Bureau of Labor Statistics

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Training, Other Qualifications, and Advancement

A bachelor's degree in engineering is generally acceptable for beginning engineering jobs. College graduates with a degree in science or mathematics and experienced technicians may also qualify for some jobs.

Many 2- or 4-year college programs in engineering technology prepare students for practical design and production work rather than for jobs that require more theoretical scientific and mathematical knowledge. Graduates of such 4-year technology programs may get jobs similar to those obtained by graduates with a bachelor's degree in engineering. However, some employers regard them as having skills between those of a technician and an engineer.

Graduate training is essential for engineering faculty positions but is not needed for the majority of entry level engineering jobs. Many engineers obtain a master's degree however, because an advanced degree often is desirable for promotion or for learning new technology. Some specialties, such as nuclear, environmental, or biomedical engineering, are taught mainly at the graduate level.

About 250 colleges and universities offer a bachelor's degree in engineering, and over 90 colleges offer a bachelor's degree in engineering technology. Although most institutions offer programs in the larger branches of engineering, only a few offer some of the smaller specialties. Therefore, students should investigate curriculums before selecting a college. Admissions requirements for undergraduate engineering schools usually include courses in advanced high school mathematics and the physical sciences.

In a typical 4-year curriculum, the first 2 years are spent studying basic sciences—mathematics, physics, chemistry, and introductory engineering—and the humanities, social sciences, and English. In the last 2 years, most courses are in engineering. Some programs offer a general engineering curriculum; students then specialize in graduate school or on the job.

Some engineering curriculums require more than 4 years to complete. Some colleges and universities offer 5-year master's degree programs. In addition, several engineering schools have arrangements whereby a student spends 3 years in a liberal arts college studying preengineering subjects and 2 years in the engineering school and receives a bachelor's degree from each.

Some 5- or even 6-year cooperative plans combine classroom study and practical work experience. In addition to gaining useful experience, students can thereby finance part of their education. To keep up with rapid advances in technology, engineers often continue their education throughout their careers.

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 1982, over 400,000 engineers were registered. Registration generally requires a degree from an accredited engineering program, 4 years of relevant work experience, and passing a State examination. Some States will not register those with degrees in engineering technology.

Beginning engineering graduates usually do routine work under the close supervision of experienced engineers and in larger companies may also receive formal classroom or seminar-type training. As they gain experience, they are assigned more difficult tasks. Some eventually become managers or administrators within engineering; others leave engineering for nontechnical managerial, administrative, and sales jobs. Some engineers obtain graduate degrees in business administration to improve advancement opportunities; others obtain law degrees and become patent attorneys. Many high level executives in government and industry began their careers as engineers.

Engineers should be able to work as part of a team and should have creativity, an analytical mind, and a capacity for detail. In addition, engineers should be able to express themselves well—both orally and in writing.

Job Outlook

Employment opportunities for those with degrees in engineering are expected to be good through 1995. In addition, there may be some opportunities for college graduates from related fields in certain engineering jobs.

Employment of engineers is expected to increase faster than the average for all occupations through 1995. Although only a relatively small proportion of engineers leave the profession each year, most job openings will arise from replacement needs. Most replacement openings are created by engineers who transfer to management, sales, or other professional occupations rather than by engineers who retire or die.

Much of the projected growth in requirements for engineers will stem from the expected higher levels of investment in industrial plants and equipment to meet the demand for more goods and services and to increase productivity. More engineers also will be needed to develop and manufacture defense-related products and to improve transportation facilities.

Engineers will be required in energy-related activities to develop sources of energy as well as to design energy-saving systems for automobiles, homes, and other buildings. Engineers also will be needed to solve environmental problems.

Most industries are less likely to lay off engineers than other workers. Many engineers work on long-term research and development projects or in other activities which often continue even during recessions. However, in industries such as electronics and aerospace, large cutbacks in defense or research and development expenditures may result in layoffs for engineers.

It is important for engineers to continue their education throughout their careers because their value to their employer depends on their knowledge of the latest technology. The pace of technological change varies by engineering specialty and industry. Engineers in high-technology areas such as advanced electronics or aerospace may find that their knowledge becomes obsolete rapidly. Even engineers who continue their education are vulnerable to obsolescence if the particular technology or product they have specialized in becomes obsolete.

Table 1. Degrees granted by engineering specialty, academic year 1980-81

Specialty	Bachelor's	Master's	Doctor's
Total	75,000	16,709	2,561
Aerospace, aeronautical, and astronautical engineering	1,809	408	109
Agricultural engineering	876	153	44
Architectural engineering	304	49	—
Bioengineering and biomedical engineering	437	185	54
Ceramic engineering	291	60	19
Chemical engineering	6,527	1,267	300
Civil, construction, and transportation engineering	10,678	2,891	325
Electrical, electronics, and communications engineering	14,938	3,901	535
Engineering, general	4,063	1,517	294
Engineering mechanics	185	126	57
Engineering physics	284	57	26
Engineering technologies	11,713	323	10
Environmental and sanitary engineering	275	485	34
Geological engineering	215	31	6
Geophysical engineering	55	17	4
Industrial and management engineering	3,833	1,631	112
Materials engineering	505	355	105
Mechanical engineering	13,329	2,291	276
Metallurgical engineering	603	193	75
Mining and mineral engineering	750	84	10
Naval architecture and marine engineering	556	80	4
Nuclear engineering	408	281	121
Ocean engineering	200	91	13
Petroleum engineering	1,035	138	16
Textile engineering	57	—	—
Other	1,074	95	12

Source: National Center for Education Statistics.

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Engineers whose employers consider not to have kept up may find themselves passed over for promotions and are particularly vulnerable to layoffs. However, it is often these high-technology areas that offer the greatest challenges, most interesting work, and the highest salaries. Therefore, the choice of engineering specialty and employer involves an assessment of the risk of possible technological obsolescence later in one's career versus the potential rewards.

Despite these problems, over the long run the number of people seeking jobs as engineers is expected to about equal the number of job openings.

(The outlook for various branches is discussed in the separate statements that follow this introductory section.)

Earnings

According to the College Placement Council, engineering graduates with a bachelor's degree and no experience averaged $25,200 a year in private industry in 1982; those with a master's degree and no experience, $28,200 a year; and those with a Ph.D., $36,300. Starting offers for those with the bachelor's degree vary by branch, as shown in the following tabulation.

Petroleum engineering	$30,468
Chemical engineering	27,072
Mining engineering	25,368
Metallurgical engineering	25,272
Mechanical engineering	25,176
Electrical engineering	24,768
Nuclear engineering	24,468
Industrial engineering	24,276
Aeronautical engineering	23,676
Civil engineering	23,100

Engineers in private industry in 1983 averaged $25,556 at the most junior level, and $66,938 at senior supervisory levels. Experienced mid-level engineers with no supervisory responsibilities earned about $36,726. (See table 2.)

In the Federal Government in 1983, most engineers with a bachelor's degree and no experience could start at $17,383 or $21,527 a year, depending on their college records. Those with a master's degree could start at $24,981, and those having a Ph.D. degree could begin at $26,959. The average salary for engineers in the Federal Government was about $36,000 in 1982.

Table 2. Engineers' salaries in private industry by work level, 1983

Level	Percent of total employed	Average salary
Engineers I	6.2	$25,556
Engineers II	12.2	27,769
Engineers III	24.8	31,307
Engineers IV	26.3	36,726
Engineers V	18.8	43,720
Engineers VI	8.8	51,460
Engineers VII	2.3	58,167
Engineers VIII	.6	66,938

Source: Bureau of Labor Statistics.

Related Occupations

Much of the work of physical scientists, life scientists, mathematicians, engineering and science technicians, and architects relates to engineering.

Sources of Additional Information

General information on engineering careers—including engineering school requirements, courses of study, and salaries—is available from:

Engineering Manpower Commission of the American Association of Engineering Societies, 345 E. 47th St., New York, N.Y. 10017.

National Society of Professional Engineers, 2029 K St. NW., Washington, D.C. 20006.

Society of Women Engineers, 345 E. 47th St., New York, N.Y. 10017.

A list of accredited engineering programs may be obtained from the Accreditation Board for Engineering and Technology, 345 E. 47th St., New York, N.Y. 10017.

Societies representing many of the individual branches of engineering are listed in this chapter. Each can provide information about careers in the particular branch.

Aerospace Engineers

(D.O.T. 002.061, .151, and .167)

Nature of the Work

Aerospace engineers design, develop, test, and help produce commercial and military aircraft, missiles, and spacecraft. They play an important role in advancing technology in commercial aviation, defense systems, and space exploration.

Aerospace engineers often specialize in areas like structural design, navigational guidance and control, instrumentation and communication, or production methods. They also may specialize in one type of aerospace product, such as passenger planes, helicopters, satellites, or rockets.

Employment

Aerospace engineers held about 44,000 jobs in 1982. Nearly 6 out of 10 jobs were located in the aircraft and parts and guided missiles and space vehicles industries. Federal Government agencies, primarily the Department of Defense and the National Aeronautics and Space Administration, provided about 2 out of 10 jobs. Business and engineering consulting firms, communications equipment manufacturing firms, and commercial airlines accounted for most of the remainder.

Employment of aerospace engineers is concentrated in States with large aerospace manufacturers, especially California, Washington, and Texas.

Job Outlook

Employment of aerospace engineers is expected to grow faster than the average for all occupations through the mid-1990's as Federal outlays increase for new military aircraft, missies, and other aerospace systems. Aerospace engineers also will be needed to design and help produce new commercial aircraft. Much of the present fleet of airliners will have to be replaced with quieter and more fuel-efficient aircraft. Increased demand for helicopters and business aircraft also will create opportunities for aerospace engineers. Despite this expected growth

An aerospace engineer discusses assembly of a missile with a production worker.

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in employment, most job openings will result from the need to replace aerospace engineers who transfer to other occupations retire, or die.

Since a large proportion of aerospace engineering jobs are defense related, severe cutbacks in defense spending—like those which took place in 1969 and 1970—can result in layoffs of aerospace engineers.

Sources of Additional Information

American Institute of Aeronautics and Astronautics, Inc., 1633 Broadway, New York, N.Y. 10019.

(See introductory section of this chapter for discussion of training requirements and earnings.)

A chemical engineer tests a coal sample.

Chemical Engineers

(D.O.T. 006.061, .151; 008.061, .151, and .167)

Nature of the Work

Chemical engineers work in many phases of the production of chemicals and chemical products. They design equipment and plants and determine and test methods of manufacturing the products. Chemical engineers also work in areas other than chemical manufacturing such as the development of processes designed to prevent pollution. Because the duties of chemical engineers cut across many fields, these professionals must have a knowledge of chemistry, physics, mathematics, and mechanical and electrical engineering.

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 pollution control or the production of a specific product like plastics or rubber.

Employment

Chemical engineers held 56,000 jobs in 1982. Three-fifths were in manufacturing industries, primarily in the chemicals, petroleum refining, and related industries. About 1 out of 6 worked for engineering service or consulting firms and a small number worked for government agencies or as independent consultants.

Job Outlook

Employment of chemical engineers is expected to grow faster than the average for all occupations through the mid-1990's. Most openings, however, will result from the need to replace chemical engineers who transfer to other occupations, retire, or die.

A major factor underlying projected employment growth is expansion in the energy and chemical industries. The growing complexity and automation of chemical processes will require additional chemical engineers to design, build, and maintain the necessary plants and equipment. Development of new chemicals used in the manufacture of consumer goods, such as plastics and synthetic fibers, will create additional openings. Also, the new field of biotechnology may create opportunities for chemical engineers.

Sources of Additional Information

American Institute of Chemical Engineers, 345 East 47th St., New York, N.Y. 10017.

American Chemical Society, 1155 16th St. NW., Washington, D.C. 20036.

(See introductory part of this section for information on training requirements and earnings.)

Civil Engineers

(D.O.T. 005.061 and .167 except -022)

Nature of the Work

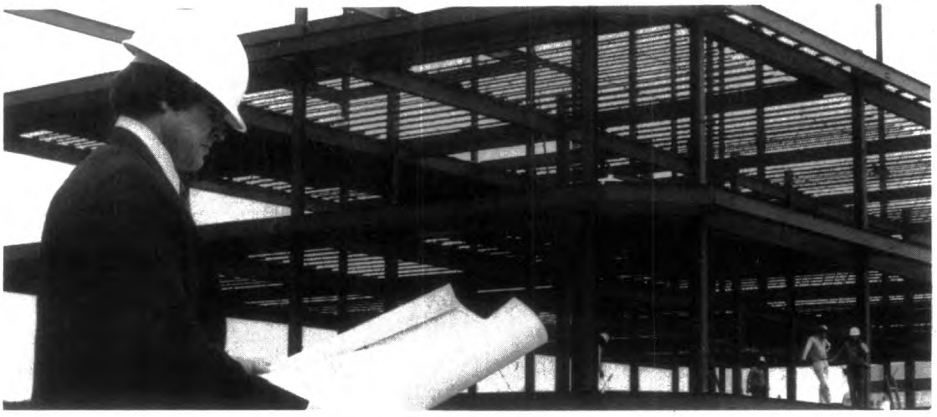
Civil engineers, who work in the oldest branch of the engineering profession, design and supervise the construction of roads, airports, tunnels, bridges, water supply and sewage systems, and buildings. Major specialties within civil engineering are structural, hydraulic, environmental (sanitary), transportation, highway, and soil mechanics.

Many civil engineers are in supervisory or administrative positions ranging from supervisor of a construction site to city engineer to top-level executive. Others work as independent consultants.

Employment

Civil engineers held over 155,000 jobs in 1982. About 40 percent of the jobs were in Federal, State, and local government agencies. About a third of the jobs were in firms that provide engineering, design, and architectural consulting services. The construction industry, public utilities, railroads, and manufacturing industries accounted for most of the rest.

Civil engineers work in all parts of the country, usually in or near major industrial and commercial centers. They often work at construction sites, sometimes in remote areas or in foreign countries. In some jobs, they often move from place to place to work on different projects.



Civil engineers often design buildings.

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Job Outlook

Employment of civil engineers is expected to increase faster than the average for all occupations through the mid-1990's. Most job openings, however, will result from the need to replace civil engineers who transfer to other occupations, retire, or die.

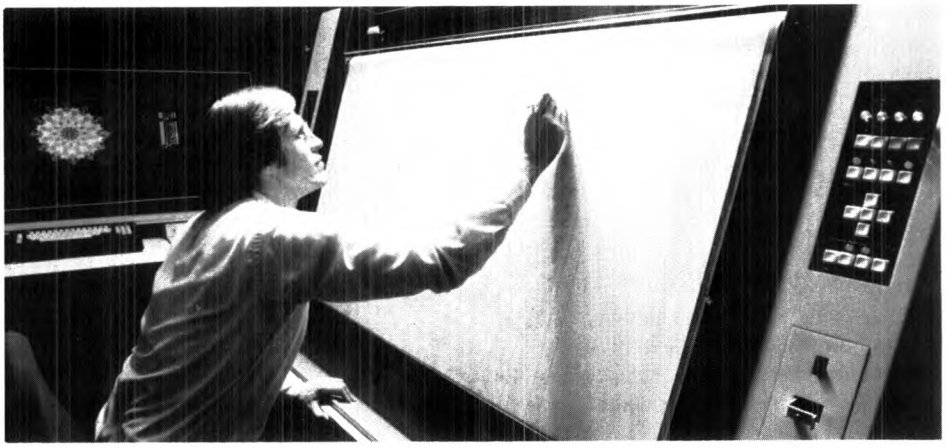
A growing population and an expanding economy will result in a need for more civil engineers to design and construct transportation systems, manufacturing plants, and other structures.

Since many civil engineers are employed in construction and related industries, employment opportunities may decrease during economic slowdowns when many new construction projects often are curtailed.

Sources of Additional Information

American Society of Civil Engineers, 345 E. 47th St., New York, N.Y. 10017.

(See introductory part of this section for information on training requirements and earnings.)



An electrical engineer checks the design of an integrated circuit.

Electrical Engineers

(D.O.T. 003.061, .151, .167, and .187)

Nature of the Work

Electrical engineers design, develop, test, and supervise the manufacture of electrical and electronic equipment. Electrical equipment includes power generating and transmission equipment used by electric utilities and electric motors, machinery controls, and lighting and wiring in buildings, automobiles, and aircraft. Electronic equipment includes radar, computers, communications equipment, and consumer goods such as TV sets and stereo components. Electrical engineers who work with electronic equipment often are called electronic engineers.

Electrical engineers generally specialize in a major area—such as power distributing equipment, integrated circuits, computers, electrical equipment manufacturing, or communications—or in a subdivision of these areas—microwave communication or aviation electronic systems, for example. Electrical engineers design new products, write performance requirements, and develop maintenance schedules. They also test equipment, solve operating problems, and estimate the time and cost of engineering projects. Besides manufacturing and research, development, and design, many are employed in administration and management or technical sales.

Employment

Electrical engineering is the largest branch of engineering. Electrical engineers held almost 320,000 jobs in 1982. Most jobs were in firms that manufacture electrical and electronic equipment, business machines, professional and scientific equipment, and aircraft and parts. Construction and engineering consulting firms, public utilities, and government agencies accounted for most of the remaining jobs. Some electrical engineers worked as independent consultants.

Job Outlook

Employment of electrical engineers is expected to increase much faster than the average for all occupations through the mid-1990's. The majority of job openings, however, will result from the need to replace electrical engineers who transfer to other occupations, retire, or die.

Although increased demand by businesses and government for computers, communications equipment, and military electronics is expected to account for much of the projected employment growth, consumer demand for electrical and electronic goods, and increased research and development in new types of automation and industrial robots should create additional jobs.

Since many electrical engineering jobs are defense related, cutbacks in defense spending—like those which took place in 1969 and 1970—could result in layoffs of electrical engineers in defense-related industries. Furthermore, those who fail to keep up with the rapid changes in technology in some electrical engineering specialties risk technological obsolescence which makes them more susceptible to layoffs or, at a minimum, likely to be passed over for advancement.

Sources of Additional Information

Institute of Electrical and Electronics Engineers/ United States Activities Board, 1111 19th St. NW., Suite 608, Washington, D.C. 20036.

(See introductory part of this section for information on training requirements and earnings.)

Industrial Engineers

(D.O.T. 010.061-026; 012.061, .067, .167 except -066, and .187)

Nature of the Work

Industrial engineers determine the most effective ways for an organization to use the basic factors of production—people, machines, materials, and energy. They are more concerned with people and methods of business organization than are engineers in other specialties, who generally work more with products or processes, such as metals, power, or mechanics.

To solve organizational, production, and related problems most efficiently, industrial engineers design data processing systems and apply mathematical concepts (operations research techniques). They also develop management control systems to aid in financial planning and cost analysis, design production planning and control systems to coordinate activities and control product quality, and design or improve systems for the physical distribution of goods and services. Industrial engineers conduct surveys to find plant locations with the best combination of raw materials, transportation, and taxes. They also develop wage and salary administration systems and job evaluation programs. Many industrial engineers move into management positions because the work is closely related.

Some industrial engineers develop computerized management control systems.

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Employment

Industrial engineers held 160,000 jobs in 1982; more than 3 out of 4 jobs were in manufacturing industries. Because their skills can be used in almost any type of organization, industrial engineers are more widely distributed among industries than other engineers. For example, some even work for insurance companies, banks, hospitals, and retail organizations. Some work for government agencies or are independent consultants.

Job Outlook

Employment of industrial engineers is expected to grow faster than the average for all occupations through the mid-1990's. Most job openings, however, will result from the need to replace industrial engineers who transfer to other occupations, retire, or die.

Industrial growth, more complex business operations, and the greater use of automation underlie the projected employment growth. Jobs also will be created as firms seek to reduce costs and increase productivity through scientific management and safety engineering.

Sources of Additional Information

Institute of Industrial Engineers, Inc., 25 Technology Park/Atlanta, Norcross, Ga. 30092.

(See introductory part of this section for information on training requirements and earnings.)

Mechanical Engineers

(D.O.T. 007.061, .151, .161-022 and -034, .167-014; 014.061, .151, and .167)

Nature of the Work

Mechanical engineers are concerned with the use, production, and transmission of mechanical power. They design and develop power-producing machines such as internal combustion engines, steam and gas turbines, and jet and rocket engines. They also design and develop power-using machines such as refrigeration and air-conditioning equipment, elevators, machine tools, printing presses, and industrial production equipment.

The work of mechanical engineers varies by industry and function. Many specialties have developed within the field; they include motor vehicles; marine equipment; energy conversion systems; heating, ventilating, and air-conditioning; instrumentation; and special machines for industries such as petroleum, rubber, plastics, and construction.

Large numbers of mechanical engineers do research, test, and design work while others work in maintenance, technical sales, and production operations. Many are administrators or managers. Some work as consultants.

Employment

Mechanical engineers held about 209,000 jobs in 1982. Almost 3 out of 5 jobs were in manufacturing—most in the machinery, transportation equipment, electrical equipment, and primary and fabricated metals industries. Business and engineering consulting services and government agencies provided most of the remaining jobs.

Job Outlook

Employment of mechanical engineers is expected to increase much faster than the average for all occupations through the mid-1990's as the demand for machinery and machine tools grows and industrial machinery and processes become increasingly complex. Mechanical engineers will be needed to develop new energy systems and to help solve environmental pollution problems. Despite this expected employment growth, however, most job openings will result from the need to replace mechanical engineers who transfer to other occupations, retire, or die.

Sources of Additional Information

The American Society of Mechanical Engineers, 345 E. 47th St., New York, N.Y. 10017.

(See introductory part of this section for information on training requirements and earnings.)

Almost 3 out of 5 mechanical engineers work in manufacturing industries.

Metallurgical Engineers

(D.O.T. 011.061, and .161.010)

Nature of the Work

Metallurgical engineers develop new types of metal tailored to meet specific requirements—heat resistant, strong but lightweight, or highly malleable. They also develop methods to process and convert metals into useful products. Most of these engineers work in one of the three main branches of metallurgy—extractive or chemical, physical, and mechanical or process. Extractive metallurgists are concerned with removing metals from ores, and refining and alloying them to obtain useful metal. Physical metallurgists deal with the nature, structure, and physical properties of metals and their alloys, and with methods of converting refined metals into final products. Mechanical metallurgists develop methods such as casting, forging, rolling, and drawing to work and shape metals. Scientists working in this field are known as metallurgists or materials scientists, but the distinction between scientists and engineers in this field is small.

A metallurgical engineer examines the structure of a metal sample.

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Employment

Metallurgical engineers held 14,000 jobs in 1982. The metal-producing industries provided over one-fourth of all jobs. Metallurgical engineers also work in industries that manufacture machinery, aircraft and parts, and electrical equipment, and in engineering consulting firms and government agencies.

Job Outlook

Employment of metallurgical engineers is expected to grow faster than the average for all occupations through the mid-1990's. Most job openings, however, will result from the need to replace metallurgical engineers who retire, die, or transfer to other occupations.

More metallurgical engineers will be needed by the metalworking industries to develop new metals and alloys as well as to adapt current ones to new applications. For example, jet engines require metals that can withstand extreme heat. As the supply of high-grade ores diminishes, more metallurgical engineers will be required to develop new ways of recycling solid waste materials and processing low-grade ores now regarded as unprofitable to mine. Metallurgical engineers also will be needed to solve problems associated with the efficient use of nuclear energy.

Sources of Additional Information

The Metallurgical Society of AIME, 420 Commonwealth Dr., Warrendale, Pa. 15086.

American Society for Metals, Metals Park, Ohio 44073.

(See introductory part of this section for information on training requirements and earnings.)

Mining engineers are usually employed at the location of mineral deposits.

Mining Engineers

(D.O.T. 010.061-014)

Nature of the Work

Mining engineers find, extract, and prepare minerals for manufacturing industries to use. They design open pit and underground 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 safe and economical operation of mines, including ventilation, water supply, power, communications, and equipment maintenance. Some mining engineers work with geologists and metallurgical engineers to locate and appraise new ore deposits. Others develop new mining equipment or direct mineral processing operations to separate minerals from the dirt, rock, and other materials they are mixed with. Mining engineers frequently specialize in the mining of one mineral, such as coal or copper.

With increased emphasis on protecting the environment, many mining engineers have been working to solve problems related to mined-land reclamation and water and air pollution.

Employment

Mining engineers held about 5,700 jobs in 1982. The mining industry provided about 3 out of 5 jobs. Other jobs were located in government agencies, engineering consulting firms, or in manufacturing industries.

Mining engineers are usually employed at the location of mineral deposits, often near small communities. However, those in research, management, consulting, or sales often are located in metropolitan areas.

Job Outlook

Employment of mining engineers is expected to increase about as fast as the average for all occupations through the mid-1990's. Most job openings, however, will result from the need to replace the large proportion of mining engineers who transfer to other occupations each year.

Efforts to attain energy self-sufficiency should spur the demand for coal and, therefore, for mining engineers. The increase in demand for coal will depend, to a great extent, on the availability and price of other energy sources such as petroleum, natural gas, and nuclear energy as well as the price of coal in other countries. More technologically advanced mining systems and further enforcement of mine health and safety regulations also will increase the need for mining engineers. In addition, exploration for all other minerals is increasing. As easily mined deposits are depleted, engineers must devise more efficient methods for mining low-grade ores. Employment opportunities also 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 oil-shale deposits could present major challenges to the mining engineer.

Sources of Additional Information

The Society of Mining Engineers of AIME, Caller Number D, Littleton, Colo. 80127.

(See introductory part of this section for information on training requirements and earnings.)

Nuclear Engineers

(D.O.T. 015.061 and .151)

Nature of the Work

Nuclear engineers design, develop, monitor, and operate nuclear power plants used to generate electricity and power Navy ships. They also conduct research on nuclear energy and radiation. For example, they may conduct research on the nuclear fuel cycle—the production, handling, and use of nuclear fuel and the safe disposal of waste produced by nuclear energy—or on new types of nuclear energy systems such as breeder reactors or fusion energy. Some nuclear engineers specialize in the development of nuclear weapons. Nuclear engineers also develop industrial and medical uses for radioactive materials.

Employment

Nuclear engineers held about 6,300 jobs in 1982. About 40 percent worked for the Federal Government. Nearly half of all federally employed nuclear engineers were civilian employees of the Navy department. About one-

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third of all federally employed nuclear engineers worked for the Nuclear Regulatory Commission and most of the rest worked for the Department of Energy or the Tennessee Valley Authority. Most nonfederally employed nuclear engineers worked for public utilities or engineering consulting companies. Some worked for manufacturers of nuclear power equipment.

Job Outlook

Employment of nuclear engineers is expected to grow faster than the average for all occupations through the mid-1990's. Nevertheless, most job openings will result from the need to replace nuclear engineers who retire, die, or leave the occupation.

Because of a combination of reduction in the growth of demand for electric power due to energy conservation and concerns over the safety of nuclear power, few new nuclear power plant construction projects may be started through the mid-1990's. However, more nuclear engineers will be needed to operate the many plants presently under construction that will be placed in operation through the mid-1990's. In addition, more nuclear engineers may be needed to improve and enforce safety standards and to work in defense-related areas.

Sources of Additional Information

American Nuclear Society, 555 North Kensington Ave., LaGrange Park, Ill. 60525.

Nuclear engineer reviews plans for a nuclear power plant.

Atomic Industrial Forum, Inc., Public Affairs and Information Program, 7101 Wisconsin Ave., Washington, D.C. 20014.

(See introductory part of this section for information on training requirements and earnings.)

Petroleum Engineers

(D.O.T. 010.061 except -014 and -026, .051, .161-010 and -014, and .167-010 and -014)

Nature of the Work

Most petroleum engineers explore and drill for oil and gas. They work to achieve the maximum profitable recovery of oil and gas from a petroleum reservoir by determining and developing the most efficient production methods.

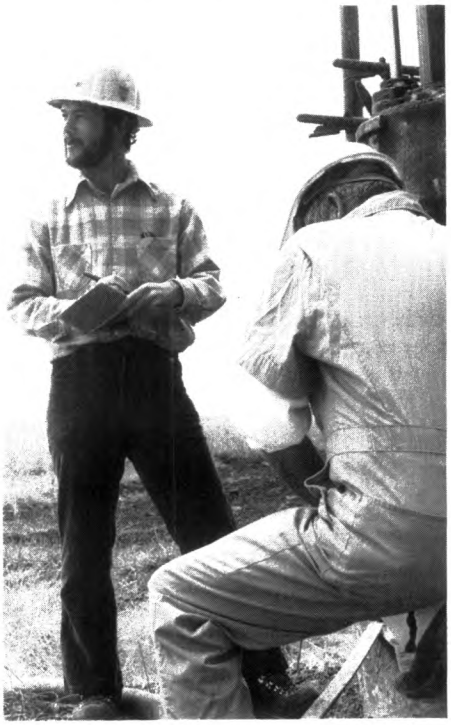
Since only a small proportion of the oil and gas in a reservoir will flow out under natural forces, petroleum engineers develop and use various enhanced recovery methods, such as flooding the oil field with water to force the oil to the surface. The best methods in use today recover only about half the oil. Petroleum engineers' research and development in the future will be directed at finding ways to increase the proportion of oil recovered in each reservoir.

Petroleum engineers also supervise drilling operations, conduct research on drilling methods, and develop new methods to recover offshore oil and gas. As oil and gas become harder to find, petroleum engineers must develop methods of recovery in areas that were previously considered inaccessible, such as the Arctic or the ocean depths.

Employment

Petroleum engineers held over 26,000 jobs in 1982, mostly in the petroleum industry and closely allied fields. Employers include major oil companies and hundreds of smaller, independent oil exploration, production, and service companies. Engineering consulting firms, government agencies, and equipment suppliers also employ petroleum engineers. A few work as independent consultants.

The petroleum engineer works mostly in places where oil and gas are found. Large numbers of petroleum engineers are employed in Texas, Oklahoma, Louisiana, and California. Also, many American petroleum engineers work overseas in oil-producing countries.



Petroleum engineers often work at oil and gas well sites.

Job Outlook

Employment of petroleum engineers is expected to grow about as fast as the average for all occupations through the mid-1990's, as economic expansion requires increasing supplies of petroleum and natural gas. With oil and gas becoming harder to find, more sophisticated and expensive recovery methods will be used to develop new sources of oil, such as offshore and in the Arctic. Also, oil and gas drilling techniques may be applied to develop geothermal energy and recover certain minerals, which would increase demand for petroleum engineers. Despite this expected employment growth, most job openings will result from the need to replace petroleum engineers who transfer to other occupations, retire, or die.

Sources of Additional Information

Society of Petroleum Engineers of AIME, 6200 North Central Expressway, Dallas, Tex. 75206.

(See introductory part of this section for information on training requirements and earnings.)

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Natural Scientists and Mathematicians

Nature of the Work

Natural scientists and mathematical scientists seek knowledge of the physical world through observation, study, and experimentation. The knowledge gained through their scientific and mathematical research activities has been used to develop new products, increase productivity, provide greater defense capabilities, protect the environment, and improve health care. Three subgroups make up this broad occupational field: Physical scientists, life scientists, and computer and mathematical occupations.

Physical scientists include those who study the nature of matter and energy both on earth and in the rest of the universe (physicists and chemists) and those who study how physical processes affect the earth (geologists and geophysicists) and its atmosphere (meteorologists).

Life scientists study living organisms and their life processes. Biological scientists study all forms of life and life processes. Most biological scientists specialize in certain areas of biology; for example, entomologists study insects and physiologists study the life processes of plants or animals. Agricultural scientists apply principles of life science to problems in agriculture such as improving crop yield or breeding better animals. Foresters and conservationists apply principles of life science to conserving and increasing the productivity of forests, rangelands, and soil.

Those in computer and mathematical occupations not only study mathematics but use it as a tool to solve practical business or scientific problems. Mathematicians, actuaries, statisticians, and systems analysts apply mathematical techniques to practical problems in business, health care, defense, and other areas.

Training, Other Qualifications, and Advancement

For some natural science and mathematics jobs, a bachelor's degree is adequate for entry. However, in fields such as mathematics, physics, biology, or agricultural science, an advanced degree is usually required for entry into professional level jobs.

Undergraduate training for natural scientists and mathematicians includes courses in their major field and in related scientific fields.

In graduate school, students take more advanced courses in their major area of study and in related sciences as well. Requirements for the master's or doctor's degree usually include a thesis, which is a report on the student's original research.

Job Outlook

In the past, growth in employment of natural scientists and mathematicians has been related to an expanding economy and to increased research and development (R&D) expenditures. Both government and industry are expected to increase their R&D expenditures through the mid-1990's in order to expand our basic knowledge of natural science, develop new technologies and products, and protect the natural environment. However, if the rate of economic growth and actual R&D levels and patterns differ from those assumed, the job outlook in many occupations described in this section would be altered.

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Mathematical Scientists and Systems Analysts

Mathematics is both a science and a tool used in many kinds of work. As a tool, mathematics is essential for understanding and expressing ideas in natural and social science, engineering, sales, and administrative and managerial occupations. (Occupations in these fields are discussed elsewhere in the *Handbook*.) Mathematical techniques increasingly are applied in these fields because of the widespread use of computers, which help solve complex problems rapidly and inexpensively.

Although mathematics is used extensively in many occupations, people in the occupations covered in this section use mathematics to a higher degree than others, and often devise new mathematical techniques to solve problems. Many persons with strong mathematical backgrounds teach mathematics or do research on both theoretical and applied mathematical problems.

Statisticians use mathematical techniques to design and interpret surveys and experiments and test theories dealing with people or things. Actuaries use statistical techniques to assess the likelihood of risks that insurance companies agree to cover and to calculate the costs associated with insuring such risks. Systems analysts use mathematical, statistical, and accounting techniques to analyze and design data processing methods for business and scientific research projects.

Most jobs related to mathematics require at least a bachelor's degree in mathematics, statistics, or a related field and a strong background in computer science. A graduate degree, preferably a doctorate, is necessary for college teaching and research positions and for advancement in many nonacademic jobs.

Actuaries

(D.O.T. 020.167-010)

Nature of the Work

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

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, company actuaries may work in investment, group underwriting, or pension planning departments. Actuaries in executive positions help determine company policy. In that role, they may be called upon to explain complex technical matters to company executives, government officials, policyholders, and the public. They may testify before public agencies on proposed legislation affecting the insurance business, for example, or explain intended changes in premium rates or contract provisions. They also may help companies develop plans to enter new lines of business.

The small number of 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 regulate insurance companies, supervise the operations of State retirement or pension systems, work on unemployment insurance or workers' compensation problems, and advise on the impact of proposed legislation. Consulting actuaries set up pension and welfare plans for private companies, unions, and government agencies. They calculate future benefits and determine the amount of employer contributions. Actuaries who are enrolled under the provisions of the Employee Retirement Income Security Act of 1974 (ERISA) evaluate these pension plans and report on their financial soundness.

Working Conditions

Actuaries have desk jobs that require no unusual physical activity; their offices generally are comfortable and pleasant.

Actuaries generally work between 35 and 40 hours a week except during busy periods, when overtime may be required. Actuaries may travel to branch offices of their company or to clients.

Actuaries analyze statistical data to determine the insurer's risk.

Employment

Actuaries held over 8,000 jobs in 1982. Many worked in insurance company headquarters in New York, Hartford, Chicago, Philadelphia, or Boston.

Most of these worked for life insurance companies; others worked for property and liability (casualty) companies. The number of actuaries employed by an insurance company depends on its volume of business and the types of insurance policies it offers. Large companies may employ over 100 actuaries; others, generally smaller companies, may rely instead on consulting firms, accounting firms, or rating bureaus (associations that supply actuarial data to member companies). Other actuaries work for private organizations administering independent pension and welfare plans or for government agencies.

Training, Other Qualifications, and Advancement

A good educational background for a beginning job in a large life or casualty company is a bachelor's degree with a major in mathematics or statistics; a degree in actuarial science is even better. Some companies hire applicants with a major in engineering, economics, or business administration, provided the applicant has a working knowledge of mathematics, including calculus, probability, and statistics (20-25

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hours). Courses in accounting, computer science, economics, and insurance also are useful. Although only 34 colleges and universities offer a degree in actuarial science, several hundred schools offer a degree in mathematics or statistics.

A strong background in mathematics is essential for persons interested in a career as an actuary. It is an advantage to pass, while still in school, one or more of the examinations offered by professional actuarial societies. Three societies sponsor programs leading to full professional status in their specialty. The Society of Actuaries gives ten actuarial examinations for the life and health insurance and pension field; the Casualty Actuarial Society gives ten examinations for the property and liability field; and the American Society of Pension Actuaries gives nine examinations covering the pension field. Because the first parts of the examination series of each society cover similar materials, students need not commit themselves to a specialty until they have taken three examinations. These test competence in subjects such as linear algebra, numerical methods, operations research, probability, calculus, and statistics. These first few examinations help students evaluate their potential as actuaries, and those who pass usually have better opportunities for employment and higher starting salaries.

Actuaries are encouraged to complete the entire series of examinations as soon as possible; completion generally takes from 5 to 10 years. Many students pass two or more actuarial examinations before graduating from college. Examinations are given twice each year. Extensive home study is required to pass the advanced examinations; many actuaries study 20-25 hours a week. Actuaries who complete five examinations in either the life insurance series or the pension series or seven examinations in the casualty series are awarded "associate" membership in their society. Those who pass an entire series receive full membership and the title "fellow."

Consulting pension actuaries who service private pension plans and certify their solvency must be enrolled by the Joint Board for the Enrollment of Actuaries. Applicants for enrollment must meet certain experience and education requirements as stipulated by the Joint Board.

Beginning actuaries often rotate among jobs to learn various actuarial operations and different phases of insurance work. At first, they prepare tabulations for actuarial tables or perform other simple tasks. As they gain experience, they may supervise 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. Actuaries who have a broad knowledge of the insurance, pension, and employee benefits fields often advance to top administrative and executive positions in underwriting, accounting, or data processing departments.

Job Outlook

Employment of actuaries is expected to grow faster than the average for all occupations through the mid-1990's. Most job openings, however, are expected to arise each year to replace actuaries who transfer to other occupations, retire, die, or stop working for other reasons. Job opportunities will be best for college graduates who have passed at least two actuarial examinations while still in school and have a strong mathematical and statistical background.

Employment in this occupation is influenced by the volume of insurance sales and pension plans, which are expected to grow over the next decade. Shifts in the age distribution of the population will result in a large increase in the number of people with established careers and family responsibilities. This is the group that traditionally has accounted for the bulk of private insurance sales.

In addition, changing insurance practices will create a need for more actuarial services. For example, as insurance companies branch out into more than one kind of insurance coverage, more actuaries will be needed to establish rates. Growth in new forms of protection, such as dental, prepaid legal, and kidnap insurance also will stimulate demand. As people live longer, they draw health and pension benefits for a longer period, and actuaries will need to recalculate the probabilities of such factors as death, sickness, and length of retirement. As more States pass competitive rating laws, many companies that previously relied on rating bureaus for actuarial data may create their own actuarial departments or use the services of consulting actuaries.

The liability of companies for damage resulting from their products has received much attention in recent years. Actuaries will continue to be involved in the development of product liability insurance, as well as medical malpractice, workers' compensation coverage, and pollution liability insurance.

Insurance coverage is considered a necessity by most individuals and businesses, regardless of economic conditions. Therefore, actuaries are unlikely to be laid off during a recession.

Earnings

In 1982, new college graduates entering the life insurance field without having passed any actuarial exams averaged about $16,000-$17,000, according to estimates by the Society of Actuaries. Beginners who had completed the first exam received between $17,000 and $18,500, and those who had passed the second exam averaged between $18,500 and $20,000, depending on geographic location.

Insurance companies and consulting firms give merit increases to actuaries as they gain experience and pass examinations. Actuaries who became associates in 1982 averaged between $24,000 and $28,000 a year; actuaries who became fellows during that year averaged between $35,000 and $45,000. Fellows with additional years of experience can earn substantially more—top actuarial executives received salaries of $50,000 a year and higher.

Related Occupations

Actuaries assemble and analyze statistics in their day-to-day work. Other workers whose jobs involve similar skills include mathematicians, statisticians, economists, financial analysts, and engineering analysts.

Sources of Additional Information

For facts about actuarial opportunities and qualifications, contact:

American Society of Pension Actuaries, 1413 K St. NW., 5th Floor, Washington, D.C. 20005.

Casualty Actuarial Society, One Penn Plaza, 250 West 34th St., New York, N.Y. 10119.

Society of Actuaries, 500 Park Blvd., Room 440, Itasca, Ill. 60143.

American Academy of Actuaries, 1835 K St. NW., Suite 515, Washington, D.C. 20006.

Computer Systems Analysts

(D.O.T. 003.167-062; 012.167-066; 020.062-010, and .067-010; and 109.067-010)

Nature of the Work

Systems analysts plan and develop methods for computerizing business and scientific tasks or improving computer systems already in use. They may work for an organization that wants the system or for a consulting firm that develops systems under contract.

Analysts begin an assignment by discussing the data processing problem with managers or specialists to determine the exact nature of the problem and to break it down into its component parts. If a retail chain wished to computerize its inventory system, for example, systems analysts would determine what information must be collected, how it would be processed, and the type and frequency of reports to be produced. After they have defined the goals of the system, they use techniques such as mathematical model building, sampling, and cost accounting to plan the system.

Once a design for the system has been developed, systems analysts prepare charts and diagrams that describe it in terms that managers and users can understand. They also may prepare a cost-benefit and return on investment analysis to help management decide whether the proposed system is satisfactory.

If the system is accepted, systems analysts may determine what computer hardware and software will be needed to set up the system. They also prepare specifications for programmers to follow and work with them to "debug," or eliminate errors from the system. (The work of computer programmers is described elsewhere in the *Handbook*). The analyst also would design any forms required to collect data and distribute information.

Because the possible uses for computers are so varied and complex, analysts usually specialize in either business, scientific, or engineering applications. Often, they have training

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or experience in the field in which they develop computer systems.

Some analysts improve systems already in use by developing better procedures or adapting the system to handle additional types of data. Others do research, called advanced systems design, to devise new methods of systems analysis.

Working Conditions

Systems analysts work in offices in comfortable surroundings. They usually work about 40 hours a week—the same as other professional and office workers. Occasionally, however, evening or weekend work may be necessary to meet deadlines.

Employment

Systems analysts held about 254,000 jobs in 1982. Most systems analysts work in urban areas for firms that manufacture durable goods, government agencies, banks, insurance companies, and data processing service firms.

Training, Other Qualifications, and Advancement

There is no universally accepted way of preparing for a job as a systems analyst because employers' preferences depend on the work being done. However, college graduates almost always are sought for these jobs; and, for some of the more complex jobs, persons with graduate degrees are preferred. Employers usually want analysts with a background in accounting, or business management for work in a business environment while a background in the physical sciences, applied mathematics, or engineering is preferred for work in scientifically oriented organizations. Many employers seek applicants who have a degree in computer science, information science, computer information systems, or data processing. Regardless of college major, employers look for people who are familiar with programming languages.

Systems analysts work with people and data.

Courses in computer concepts, systems analysis, and data base management systems offer good preparation for a job in this field.

Prior work experience is important. About 7 out of 10 persons entering this occupation typically transfer from other occupations, such as engineer, manager, and computer programmer.

Systems analysts must be able to think logically, have good communication skills, and like working with ideas and people. They often deal with a number of tasks simultaneously. The ability to concentrate and pay close attention to detail also is important. Although systems analysts often work independently, they also work in teams on large projects. They must be able to communicate effectively with technical personnel, such as programmers and managers, as well as with people who have no computer background.

Technological advances come so rapidly in the computer field that continuous study is necessary to keep skills up to date. Training usually takes the form of 1- and 2-week courses offered by employers and "software" vendors. Additional training may come from professional development seminars offered by professional computing societies.

An indication of experience and professional competence is the Certificate in Data Processing (CDP). This designation is conferred by the Institute for Certification of Computer Professionals upon candidates who have completed 5 years' experience and passed a five-part examination.

In large data processing departments, persons who begin as junior systems analysts may be promoted to senior or lead systems analysts after several years of experience. Systems analysts who show leadership ability also can advance to jobs as managers of systems analysis or data processing departments. Systems analysts with several years of experience may start their own computer consulting firms.

Job Outlook

Employment of systems analysts is expected to grow much faster than the average for all occupations through the mid-1990's. The demand for systems analysts is expected to rise as advances in technology increase computer capabilities leading to new applications for computers. Factory and office automation, telecommunications, and scientific research are just a few areas where use of computer systems will expand. About half of all job openings for systems analysts will result from replacement needs—although a smaller proportion of systems analysts than all professional workers leave their occupation each year. Most of the systems analysts who leave the occupation transfer to other jobs such as manager or engineer.

College graduates who have had courses in computer programming, systems analysis, and other data processing areas as well as training or experience in an applied field should enjoy the best prospects for employment. Persons without a college degree and college graduates unfamiliar with data processing will face competition from the large number of experienced workers seeking jobs as systems analysts.

Earnings

Median annual earnings of systems analysts who worked full time in 1982 were about $540 a week. The middle 50 percent earned between $420 and $680 a week. The lowest 10 percent earned less than $330 a week; the highest tenth, more than $850.

Earnings for beginning business systems analysts in private industry averaged about $446 a week in 1982, according to surveys conducted in urban areas by the Bureau of Labor Statistics. Experienced workers earned from $480 to $550, and lead systems analysts earned about $596 weekly. In the Federal Government, the entrance salary for recent college graduates with a bachelor's degree was about $300 a week in early 1982.

Systems analysts working in the North and West earned somewhat more than those in the South, and generally their earnings were greater in transportation and public utilities, or manufacturing than in finance, trade, or services.

Related Occupations

Other workers in applied mathematics, business, and science who use logic and reasoning ability to solve problems are programmers, financial analysts, urban planners, engineers, mathematicians, operations research analysts, and actuaries.

Sources of Additional Information

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

Association for Systems Management, 24587 Bagley Rd., Cleveland, Ohio 44138.

Computer Careers-DOL, DPMA, 505 Busse Hwy., Park Ridge, Ill. 60068.

Information about the Certificate in Data Processing is available from:

The Institute for Certification of Computer Professionals, 35 E. Wacker Dr., Suite 1752, Chicago, Ill. 60601.

Mathematicians

(D.O.T. 020.067-014 and -022)

Nature of the Work

Mathematicians work in one of the oldest and most basic sciences. 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.

Mathematical work falls into two broad classes: Theoretical (pure) mathematics; and applied mathematics. However, these classes are not sharply defined and often overlap.

Theoretical mathematicians advance mathematical science by developing new principles and new relationships between existing principles of mathematics. Although they seek to increase basic knowledge without necessarily considering its practical use, this pure and abstract knowledge has been instrumental in producing many scientific and engineering achievements. For example, in 1854 G.F.B. Riemann invented a seemingly impractical non-Euclidian geometry that was to become

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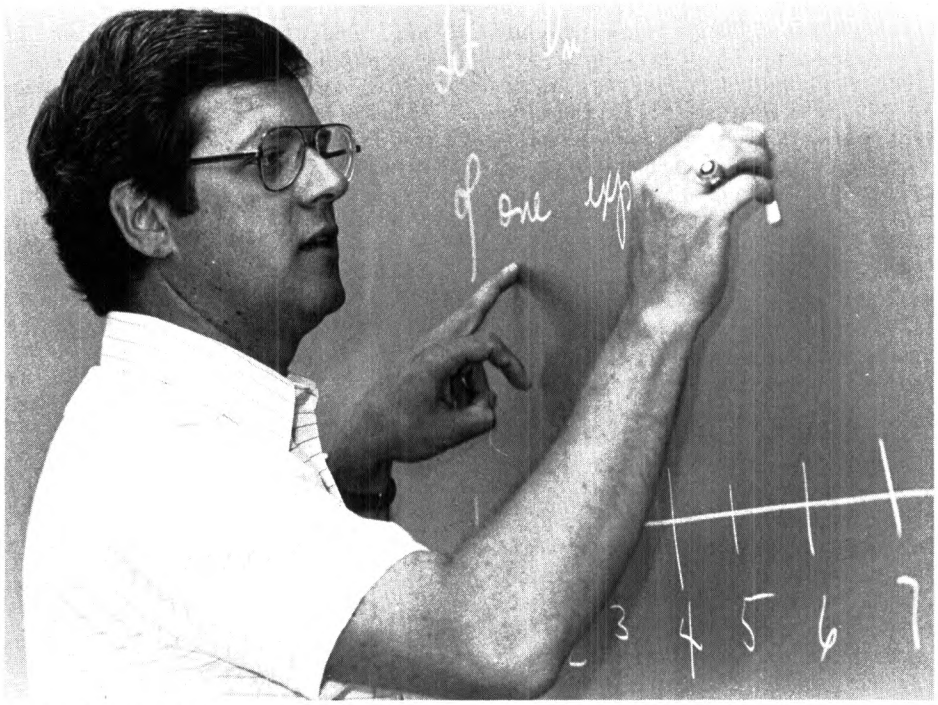


Mathematics teaching has increased in importance.

part of Albert Einstein's theory of relativity. Years later, this theory contributed to the creation of atomic power.

Applied mathematicians use mathematics to develop theories, techniques, and approaches to solve practical problems in business, government, engineering, and the natural and social sciences. Their work ranges from analysis of the mathematical aspects of launching communications satellites to studies of the effects of new drugs on disease.

Much work in applied mathematics, however, is carried on by persons other than mathematicians. In fact, the number of workers using mathematical techniques is many times greater than the number actually designated as mathematicians.

Working Conditions

Mathematicians work almost exclusively in offices and classrooms. Most have regular hours and travel infrequently. They often work with engineers, computer scientists, and others. Increasingly, they are establishing firms offering research and consulting services.

Employment

Mathematicians held about 11,000 jobs in 1982. In addition, about 30,000 persons held mathematics faculty positions in colleges and universities, according to data from the National Science Foundation. (See the statement on college and university faculty elsewhere in this *Handbook*).

Most mathematicians worked in service and manufacturing industries and in the Federal Government. Major employers within the services sector were miscellaneous business services (including research and development laboratories); engineering, architectural, and surveying services; and educational services. Within manufacturing, communications equipment; guided missiles and space vehicles; and aircraft industries provided the most jobs. The Department of Defense and the National Aeronautics and Space Administration employed almost three-fourths of the mathematicians working in the Federal Government.

Mathematicians work in all States, but are concentrated in those with high-technology industries.

Training, Other Qualifications, and Advancement

An advanced degree is the preferred requirement for beginning teaching jobs, as well as for most research positions. However, in most 4-year colleges and universities, the Ph.D. degree is necessary for full faculty status. Although the master's degree is generally required, a bachelor's degree is adequate preparation for teaching jobs in some 2-year colleges and technical institutes.

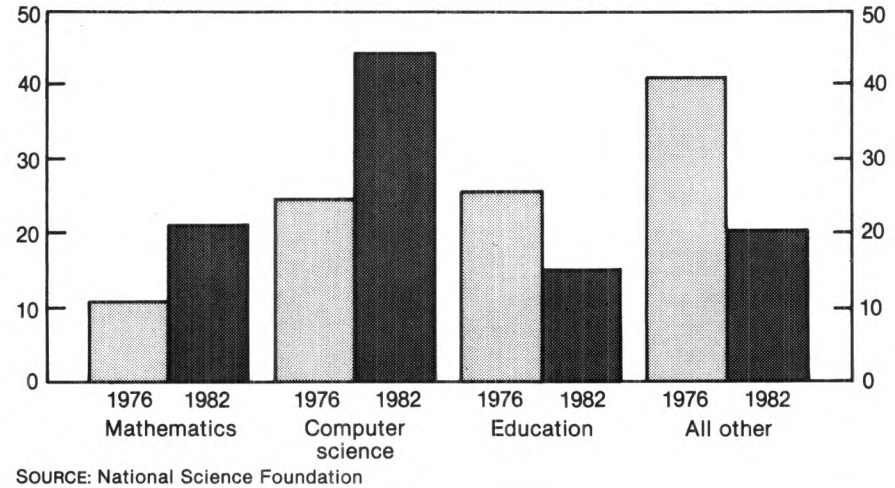
A bachelor's degree is considered adequate preparation for some jobs in private industry and government. Individuals with this background usually assist senior mathematicians by performing computations and solving less advanced problems in applied mathematics. The majority of bachelor's degree holders work in related fields such as computer science where employment opportunities are rapidly expanding. However, an advanced degree is a prerequisite for the more responsible positions. Most research positions require the doctorate.

The bachelor's degree in mathematics is offered by most colleges and universities. Mathematics courses usually required for a degree are analytical geometry, calculus, differential equations, probability theory and statistics, mathematical analysis, and modern algebra. Many colleges and universities urge or even require students majoring in mathematics to take several courses in a field that uses or is closely related to mathematics, such as computer science, operations research, a physical science, or economics. A prospective college mathematics student should take as many mathematics courses as possible while in high school.

More than 400 colleges and universities offer the master's degree in mathematics; about 150 also offer the Ph.D. In graduate school, students conduct research and take advanced courses, usually in a specific field of mathematics such as algebra, mathematical analysis, or geometry.

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; of

The proportion of mathematics graduates (bachelor's and master's degrees) employed in computer science increased sharply between 1976 and 1982.



SOURCE: National Science Foundation

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increasing importance are computer and information science, business and industrial management, economics, statistics, chemistry and life sciences, and the behavioral sciences.

Mathematicians should have a working knowledge of computer programming since most complex mathematical computation is done by computer.

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 since they often need to discuss the problem to be solved with nonmathematicians.

Job Outlook

Employment of mathematicians is expected to increase about as fast as the average for all occupations through the mid-1990's. Most job openings, however, will arise from the need to replace experienced mathematicians who transfer to other occupations, retire, or leave the labor force for other reasons.

Those with Ph.D. degrees in mathematics should have very favorable employment opportunities. Holders of the doctorate in applied mathematics customarily have better employment prospects than their theoretically-oriented colleagues. However, the present shortage of Ph.D.'s is expected to continue, and the demand for holders of the doctorate in theoretical mathematics should strengthen substantially.

Industry and government agencies will need mathematicians for work in operations research, numerical analysis, computer systems design and programming, information and data processing, applied mathematical physics, market research, commercial surveys, and as consultants in industrial laboratories.

Those with a bachelor's or master's degree in mathematics may have difficulty finding a job in university teaching or theoretical research. However, there will be many openings in applied areas such as computer science and data processing.

Earnings

According to a 1982 College Placement Council Survey, starting salaries for mathematicians with a bachelor's degree averaged about $21,300 a year. Those with a master's degree started at about $25,900 annually. Salaries for new graduates having the Ph.D., most of whom had some experience, averaged over $30,500. The median annual salary for all working mathematicians was about $28,600 in 1982.

In the Federal Government in 1982, the average starting salary for mathematicians having the bachelor's degree and no experience was either $13,000 or $16,100 a year, depending on their college records. Those with the master's degree averaged $19,700 or $23,800; and persons having the Ph.D. degree started at either $23,800 or $28,500. The average salary for all mathematicians in the Federal Government was about $33,400 in 1982.

Related Occupations

A degree in mathematics generally qualifies one to enter related occupations such as statistician, computer programmer, systems analyst, and operations research analyst. In addition, a strong background in mathematics facilitates employment in fields such as engineering, economics, finance, and genetics.

Sources of Additional Information

Several brochures are available that give facts about the field of mathematics, including career opportunities, professional training, and colleges and universities with degree programs.

Seeking Employment in the Mathematical Sciences is available for 50 cents from:

American Mathematical Society, P.O. Box 6248, Providence, R.I. 02940.

Professional Opportunities in Mathematics is available for $1.50 from:

Mathematical Association of America, 1529 18th St. NW., Washington, D.C. 20036.

For specific information on careers in applied mathematics, contact:

Society for Industrial and Applied Mathematics, 1405 Architects Building, 117 S. 17th St., Philadelphia, Pa. 19103.

For information on a career as a mathematical statistician, contact:

Professor Kjell Doksum, Institute of Mathematical Statistics, Department of Statistics, University of California, Berkeley, Calif. 94720.

Information on Federal job opportunities is available from area offices of the State employment service and the U.S. Office of Personnel Management or from Federal Job Information Centers located in various large cities throughout the country.

Statisticians

(D.O.T. 020.167-026)

Nature of the Work

Statistics are numbers that help describe the characteristics of the world and its inhabitants. Statisticians devise, carry out, and interpret the numerical results of surveys and experiments. In doing so, they apply their knowledge of statistical methods to a particular subject area, such as economics, human behavior, natural science, 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.

Often statisticians are able to obtain accurate information about a group of people or things by surveying a small portion, called a sample, of the group. For example, to determine the size of the total audience, television rating services ask only a few thousand families, rather than all viewers, what programs they watch. Statisticians decide where and how to get the data, determine the type and size of the sample group, and develop the survey questionnaire or

Computers have greatly improved the statistician's ability to analyze large amounts of data quickly.

reporting form. They also prepare instructions for workers who will tabulate the returns.

Since statistics are used in so many areas, it sometimes is 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.

Working Conditions

Statisticians usually work regular hours in offices. Some statisticians may travel occasionally to supervise or set up a survey, or to gather statistical data. Some may have fairly repetitive tasks, while others may have a variety of tasks such as designing surveys or interpreting data.

Employment

Statisticians held over 20,000 jobs in 1982. About 6 out of 10 jobs were in industry, primarily in manufacturing, finance, insurance companies, and business service establishments such as consultants' offices. Over one-third were in Federal, State, or local government. Federally employed statisticians were concentrated in the Departments of Commerce, Agriculture, Health and Human Services, and Defense. Others worked in colleges and universities and nonprofit organizations.

Although statisticians work in all parts of the country, most are in metropolitan areas such as New York City; Washington, D.C.; and Los Angeles-Long Beach, Calif.

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 entry level statistical jobs, however, a bachelor's degree with a major in an applied field such as economics or a life science and a minor in statistics is preferable.

Over 200 colleges and universities offered statistics as a concentration for a bachelor's degree in 1982. Many schools also offer either a

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degree in mathematics or a sufficient number of courses in statistics to qualify graduates for beginning positions. Required subjects for statistics majors include mathematics through differential and integral calculus, statistical methods, and probability theory. Due to the rapid expansion of statistical computing—the use of computers for statistical applications—courses in computer science are highly recommended. For quality-control positions, training in engineering or physical or biological science is desirable. For many market research, business analysis, and forecasting jobs, courses in economics and business administration are helpful.

Many colleges and universities also offered graduate degrees in statistics in 1982, and many other schools offered one or two graduate level statistics courses. Acceptance into graduate programs does not require an undergraduate degree in statistics although a good mathematics background is essential.

Beginning statisticians who have only the bachelor's degree often spend much of their time doing routine work supervised by an experienced statistician. Through experience, they may advance to positions of greater technical and supervisory responsibility. However, opportunities for promotion are best for those with advanced degrees.

Job Outlook

Employment opportunities for persons who combine training in statistics with knowledge of a field of application are expected to be favorable through the mid-1990's. Although growth will be average in this field, most openings are expected to result from the need to replace experienced statisticians who transfer to other occupations, retire, or leave the labor force for other reasons.

Private industry will require increasing numbers of statisticians for quality control in manufacturing. Statisticians with 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 than in the past on statisticians to forecast sales, analyze business conditions, modernize accounting procedures, and help solve management problems. Additional statisticians will be needed as sophisticated statistical services are increasingly contracted out to consulting firms.

Other fields have recognized the usefulness of statistics. For example, statistical techniques are used to analyze legal problems and the judicial process as well as sociological and psychological relationships. As the use of statistics expands into new areas, more statisticians will be needed.

Federal, State, and local government agencies will need statisticians for existing programs in fields such as agriculture, demography, transportation, social security, health, and education, and relatively new programs such as energy conservation and environmental quality control.

Earnings

In the Federal Government in 1982, the average starting salary of statisticians who had the bachelor's degree and no experience was $13,000 or $16,100 a year, depending on their college grades. Beginning statisticians with the master's degree averaged $19,700 or $23,800. Those with the Ph.D. began at $23,800 or $28,500. The average annual salary for statisticians in the Federal Government was about $32,700 in 1982.

Salaries in private industry were lower than those in the Federal Government, according to the limited data available.

Related Occupations

Workers in the following occupations may use statistics extensively: Market research analysts, urban and regional planners, engineers, environmental scientists, health scientists, life scientists, physical scientists, and social scientists. Others who work with numbers are actuaries, mathematicians, financial analysts, computer programmers, and systems analysts.

Sources of Additional Information

For information about career opportunities in statistics, contact:

American Statistical Association, 806 15th St. NW., Washington, D.C. 20005.

Information on Federal job opportunities is available from area offices of the State employment service and the U.S. Office of Personnel Management or from Federal Job Information Centers located in various large cities throughout the country.

For information on a career as a mathematical statistician, contact:

Professor Kjell Doksum, Institute of Mathematical Statistics, Department of Statistics, University of California, Berkeley, Calif. 94720.

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Physical Scientists

Physical scientists investigate the structure and composition of the earth and the universe. Many physical scientists perform research designed to increase basic scientific knowledge. Others employ the results of research to solve practical problems in developing new products, locating new sources of oil, or predicting the weather.

This section covers four physical science occupations—chemists, geologists and geophysicists, meteorologists, and physicists (which includes astronomers). Persons who teach the physical sciences in colleges and universities are discussed in the statement on college and university faculty elsewhere in the *Handbook*.

Most physicists have Ph.D.'s. The jobs of many other physical scientists also require a Ph.D., especially research positions, but some jobs in these other fields can be entered with a bachelor's degree.

A knowledge of the physical sciences (especially chemistry and physics) is also required by engineers and life scientists; these occupations are discussed elsewhere in the *Handbook*.

Chemists

(D.O.T. 022.061-010 and -014, .137-010, .161-010; and 041.061-026)

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 search for and put to practical use new knowledge about substances. Their research has resulted in the development of a tremendous variety of synthetic materials, such as nylon and polyester fabrics, and processes which help save energy and reduce pollution, such as improved oil refining methods. Research on the chemistry of living things provides the basis for advances in medicine, agriculture, and other areas.

Over 60 percent of all chemists work in research and development. In basic research, chemists investigate the properties, composition, and structure of matter and the laws that govern the combination of elements and reactions of substances. In applied research and development, they create new products or improve existing ones, often using knowledge gained from basic research. For example, synthetic rubber and plastics have resulted from research on small molecules uniting to form larger ones (polymerization).

The process of developing a product begins with descriptions of the characteristics it should have. If similar products exist, chemists test samples to determine their ingredients. If no such product exists, chemists experiment with various substances to develop a product with the required specifications.

About 10 percent of all chemists work in production and inspection. In production, chemists prepare instructions (batch sheets) for plant workers that specify the kind and amount of ingredients to use and the exact mixing time for each stage in the process or monitor automated processes to ensure proper product yield and quality. At each step, samples are tested for quality control to meet industry and government standards. Chemists keep records and prepare reports showing results of tests. Others work as marketing or sales representatives where they sell and provide technical information on chemical products.

Chemists often specialize in a subfield of chemistry. *Analytical chemists* determine the structure, composition, and nature of substances, and develop new analytical techniques. An outstanding example of the capabilities of this specialty was the analysis of moon rocks by an international team of analytical chemists. *Biochemists* study the chemical composition of living things. They try to understand the complex chemical combinations and reactions involved in reproduction, growth, and heredity. Recent advances in biochemistry have resulted in the discovery of many of the mechanisms of reproduction and heredity, including how to splice genes (a technique called recombinant DNA). These discoveries will probably lead to major advances in medicine and to the development of new products and production processes. *Organic chemists* study the chemistry of carbon compounds. When combined with other elements, carbon forms a vast number of substances. Many modern commercial products, including drugs, plastics, and other synthetics, have resulted from the work of organic chemists. *Inorganic chemists* study compounds other than carbon. They may, for example, develop materials for electronic components. *Physical chemists* study the physical characteristics of atoms and molecules and investigate how chemical reactions work. This research may result in new and better energy sources.

Working Conditions

Chemists usually work regular hours in offices and laboratories. Some are exposed to health or safety hazards when handling certain chemicals, but there is little risk if proper procedures are followed.

Employment

Chemists held about 89,000 jobs in 1982. Almost two-thirds of all chemists work for manufacturing firms—about one-half of these are in the chemical manufacturing industry; the rest are scattered throughout other manufacturing industries. Chemists also work for State and local governments, primarily in health and agriculture, and for Federal agencies, chiefly the Departments of Defense, Health and Human Resources, and Agriculture. Smaller numbers work for nonprofit research organizations. In addition, about 19,000 persons held chemistry faculty positions in colleges and universities in 1982. (See the statement on college and university faculty elsewhere in the *Handbook*.)

Chemists are employed in all parts of the country, but they are concentrated in large industrial areas.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in chemistry or a related discipline is sufficient for many beginning jobs as a chemist. However, graduate training is required for most research jobs, and most college teaching jobs require a Ph.D. degree. Beginning chemists should have a broad background in chemistry, with good laboratory skills.

Many colleges and universities offer a bachelor's degree program in chemistry. About 550 are approved by the American Chemical Society. In addition to required courses in analytical, inorganic, organic, and physical chemistry, undergraduates usually study mathematics, physics, and liberal arts.

Several hundred colleges and universities award advanced degrees in chemistry. Graduate students generally specialize in a subfield of chemistry. Requirements for the master's and doctor's degree usually include a thesis based on independent research.

Students planning careers as chemists should enjoy studying science and mathematics, and should like working with their hands building scientific apparatus and performing experiments. Perseverance and the ability to concentrate on detail and to work independently are essential. Other assets include an inquisitive mind and imagination.

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. Some in entry level positions are considered chemists; others are considered senior chemical technicians. Employers may have training and orientation programs which provide special knowledge needed for the employer's type of work. Candidates for an advanced degree often teach or do research in colleges and universities while working toward their degrees.

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Chemists with a bachelor's degree often get jobs analyzing or testing products or assisting senior chemists in research and development laboratories.

Beginning chemists with the master's degree can usually teach in a 2-year college or go into applied research in government or private industry. The Ph.D. generally is required for basic research, for 4-year college faculty positions, and for advancement to many administrative positions.

Many people with a bachelor's degree in chemistry also enter a wide range of occupations with little or no connection to chemistry. Some enter medical, dental, veterinary, or other health profession schools.

Job Outlook

Employment of chemists is expected to grow about as fast as the average for all occupations through the mid-1990's. In addition to jobs arising from increased demand for chemists, many openings will result each year as chemists transfer to other occupations, retire, or die.

The majority of job openings are expected to be in private industry, primarily in the development of new products. In addition, industrial companies will need more chemists—especially biochemists—to do biotechnology research and to develop products and production processes arising from this research.

Little growth in the employment of chemistry faculty in colleges and universities is expected.

Chemistry graduates may become high school teachers. However, they usually are then regarded as science teachers rather than chemists. Others may qualify as engineers, especially if they have taken some courses in engineering. (See statements on secondary school teachers and engineers elsewhere in the *Handbook*.)

Earnings

According to the College Placement Council, chemists with the bachelor's degree were offered starting salaries averaging $21,000 a year in 1982; those with the master's degree, $23,800; and those with the Ph.D., $32,600.

According to the American Chemical Society, salaries of experienced chemists in private industry having a bachelor's degree averaged $29,000 a year in 1982; for those with a master's degree, $33,000; and for those with a Ph.D., $42,000.

Depending on a person's college record, the annual starting salary in the Federal Government in early 1983 for an inexperienced chemist with a bachelor's degree was either $13,369 or $16,559. Those who had 2 years of graduate study could begin at $20,256 a year. Chemists having the Ph.D. degree could start at $24,508 or $29,374. The average salary for all chemists in the Federal Government in 1982 was $32,800 a year.

Related Occupations

The work of chemical engineers, occupational safety and health workers, agricultural scientists, biological scientists, and chemical technicians is closely related to the work done by chemists. Many manufacturers' sales representatives and wholesale trade sales workers in chemical marketing use a knowledge of chemistry in their work, as do many technical writers. The work of other physical and life science occupations may also be similar to that of chemists.

Sources of Additional Information

General information on career opportunities and earnings for chemists is available from:

American Chemical Society, 1155 16th St. NW., Washington, D.C. 20036.

Information on careers in biochemistry is available from:

American Society of Biological Chemists, 9650 Rockville Pike, Bethesda, Md. 20014.

Information on Federal job opportunities is available from local offices of State employment services and the U.S. Office of Personnel Management or from Federal Job Information Centers located in various large cities throughout the country.

Geologists and Geophysicists

(D.O.T. 024.061, .161, and .167)

Nature of the Work

Geologists and geophysicists study the physical aspects and history of the earth. They analyze information collected through seismic prospecting techniques, which involve bouncing sound waves off deeply buried rock layers; examine surface rocks and samples of buried rocks recovered by drilling; and study information collected by satellites. They also identify rocks and minerals, conduct geological surveys, construct maps, and use instruments such as the gravimeter and magnetometer to measure the earth's gravity and magnetic field. An important application of geological research is locating oil and other minerals.

Geologists and geophysicists examine chemical and physical properties of specimens in laboratories under controlled temperature and pressure. They may study fossil remains of animal and plant life or experiment with the flow of water and oil through rocks. Laboratory equipment used includes instruments such as the X-ray diffractometer, which determines the structure of minerals, and the petrographic microscope, used for close study of rock formations.

Besides locating resources and working in laboratories, geologists and geophysicists also advise construction companies and government agencies on the suitability of proposed locations for buildings, dams, or highways. Some administer and manage research and exploration programs.

The fields of geology and geophysics are closely related but there are differences. Geologists study the composition, structure, and history of the earth's crust. They try to find out how various rocks were formed and what has happened to them throughout history. Geophysicists use the principles of physics and mathematics to study the earth's internal composition, surface, and atmosphere and also

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various forces such as its magnetic, electrical, and gravitational fields.

Geologists and geophysicists usually specialize. *Geodesists* study the size, shape, and gravitational field of the earth. Their principal task is to make very precise measurements for mapping the earth's surface. *Hydrologists* study the distribution, circulation, and physical properties of underground and surface waters. They may study the form and intensity of precipitation, its rate of infiltration into the soil, and its return to the ocean and atmosphere. *Mineralogists* analyze and classify minerals and precious stones according to composition and structure. *Paleontologists* study fossils found in geological formations to trace the evolution of plant and animal life. *Seismologists* study and interpret data from seismographs, which measure small movements of the earth, and other instruments to locate earthquakes and earthquake faults. *Stratigraphers* study the distribution and arrangement of sedimentary rock layers by examining their fossil and mineral content. *Meteorologists* sometimes are classified as geophysical scientists. (See the statement on meteorologists elsewhere in the *Handbook*.)

Working Conditions

Most geologists and geophysicists divide their time between fieldwork and office or laboratory work. While in the field, geologists often travel to remote sites by helicopter or jeep and cover large areas by foot. Exploration geologists and geophysicists often work overseas or in remote areas. When not working outdoors, geologists are in comfortable, well-lighted, well-ventilated offices and laboratories.

Employment

Geologists and geophysicists held almost 49,000 jobs in 1982. Over two-fifths were in oil and gas companies, and almost one-sixth were in service firms, many of which are involved in oil and gas exploration. Mining and quarrying companies also employ many geologists and geophysicists. Self-employed geologists held about 1 in 6 jobs, primarily as industry and government consultants.

A geologist studies geological data plotted by a computer.

The Federal Government employed almost 5,600 geologists, geophysicists, geodesists, and hydrologists in 1982. Almost two-thirds worked for the Department of the Interior in the U.S. Geological Survey, the Bureau of Mines, and the Bureau of Reclamation. Other Federal agencies that employ geologists and geophysicists include the Departments of Defense, Agriculture, Commerce, and Energy. State agencies also employ geologists and geophysicists; some work on surveys in cooperation with the U.S. Geological Survey. Geologists and geophysicists also work for nonprofit research institutions and museums. Some are employed by American firms overseas for varying periods of time. In addition, about 7,000 persons held geology and geophysics faculty positions in colleges and universities in 1982. (See the statement on college and university faculty elsewhere in the *Handbook*.)

Training, Other Qualifications, and Advancement

A bachelor's degree in geology or geophysics is adequate for entry into some lower level geology jobs, but better jobs with good advancement potential usually require at least a master's degree in geology or geophysics. Persons with strong backgrounds in physics, mathematics, or computer science also may qualify for some geophysics jobs. A Ph.D degree is essential for most research positions.

Over 500 colleges and universities offer a bachelor's degree in geology and about 75 colleges and universities offer a bachelor's degree in geophysics. Other programs offering training for beginning geophysicists include geophysical technology, geophysical engineering, geophysical prospecting, engineering geology, petroleum geology, and geodesy.

More than 220 universities award advanced degrees in geology and about 70 universities grant advanced degrees in geophysics.

Geologists and geophysicists need to be able to work as part of a team. They should be curious, analytical, and able to communicate effectively. Those involved in fieldwork must have physical stamina.

Geologists and geophysicists usually begin their careers in field exploration or as research assistants in laboratories. With experience, they can be promoted to project leader, program manager, or other management and research positions.

Job Outlook

Employment of geologists and geophysicists is expected to grow about as fast as the average for all occupations through the mid-1990's. In addition to new jobs created by increased demand for geologists, many openings will arise each year as geologists leave the occupation, retire, or die.

Efforts to locate new sources of energy as older sources become exhausted will continue to stimulate domestic exploration activities and create a need for many additional geologists, although exploration activity may vary over the short run depending on the price and demand for oil. Geologists and geophysicists who have knowledge and experience in geophysical oil and gas exploration techniques may experience better employment opportunities than others. Additional geologists and geophysicists will be needed to discover new mineral resources, to devise techniques for exploring deeper within the earth's crust, and to develop more efficient methods of mining. They also will be needed to develop more adequate water supplies and waste disposal methods, and to do site evaluation for construction activities.

Earnings

Median annual earnings of full time geologists and geophysicists were about $33,000 in 1982; the middle 50 percent earned between $25,000 and $40,000 annually. According to surveys done by the College Placement Council, graduates with bachelor's degrees in physical and earth sciences received average starting offers of $23,800 a year in 1982. Graduates with master's degrees in geology and related geological sciences received average starting offers of $29,000 a year.

In the Federal Government in early 1983, geologists and geophysicists having a bachelor's degree could begin at $13,369 or $16,559 a year, depending on their college records. Those having a master's degree could start at $16,559 or $20,256 a year; those having the Ph.D. degree, at $24,508 or $29,374. In 1982, the average salary for geologists in the Federal Government was about $33,000 a year and for geophysicists, about $35,200 a year.

Related Occupations

Many geologists and geophysicists work in the petroleum and natural gas industry. This industry also employs many other workers who are involved in the scientific and technical aspects of petroleum and natural gas exploration and extraction, including drafters, engineering technicians, laboratory assistants (petroleum production), petroleum engineers, and surveyors. Also related to the work of geologists and geophysicists are other physical science occupations such as physicists, chemists, meteorologists, and oceanographers as well as mathematicians and computer scientists.

Sources of Additional Information

Information on training and career opportunities for geologists is available from:

American Geological Institute, 5202 Leesburg Pike, Falls Church, Va. 22041.

Information on training and career opportunities for geophysicists is available from:

American Geophysical Union, 2000 Florida Ave. NW., Washington, D.C. 20009.

Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, Okla. 74101.

For information on Federal Government careers, contact:

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U.S. Office of Personnel Management, 1900 E St. NW., Washington, D.C. 20415.

Meteorologists

(D.O.T. 025.062-010)

Nature of the Work

Meteorology is the study of the atmosphere, which is the air that surrounds the earth. Meteorologists try to understand the atmosphere's physical characteristics, motions, and processes, and determine the way the atmosphere affects the rest of our environment. The best known application of this knowledge is in understanding and forecasting the weather. However, weather information and meteorological research also is applied in many other areas, such as air pollution control, fire prevention, agriculture, air and sea transportation, and studying trends in the earth's climate.

Meteorologists who forecast the weather, known professionally as *operational or synoptic meteorologists*, are the largest group of specialists in this field. They study past and current weather information, such as air pressure, temperature, humidity, and wind velocity, and apply physical and mathematical relationships to make short-range 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 and analyzed by computers.

Some meteorologists engage in basic and applied research. For example, *physical meteorologists* study the chemical and physical properties of the atmosphere. They do research on the effect of the atmosphere on transmission of light, sound, and radio waves, as well as study factors affecting formation of clouds, rain, snow, and other weather phenomena. Other meteorologists, known as *climatologists*, study trends in climate 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 used to plan heating and cooling systems, design buildings, and aid in effective land utilization.

Working Conditions

Jobs in weather stations, most of which operate around the clock 7 days a week, often involve night work and rotating shifts. Most stations are at airports or in or near cities; some are in isolated and remote areas. Meteorologists in smaller weather stations generally work alone; in larger ones, they work as part of a team.

Employment of meteorologists is expected to grow more slowly than the average for all occupations through the mid-1990's.

Employment

Meteorologists held about 3,700 jobs in 1982. In addition, about 1,000 persons held meteorology faculty positions in colleges and universities in 1982. (See the statement on college and university faculty elsewhere in the *Handbook*.)

The largest employer of civilian meteorologists was the National Weather Service, where about 1,800 worked at stations in all parts of the United States and in a small number of foreign areas. The Department of Defense employed almost 200 civilian meteorologists. A few worked for State and local governments and for nonprofit organizations.

In addition to government, private weather consulting firms and radio and television stations employed many meteorologists. Commercial airlines also employed meteorologists to forecast weather along flight routes and to brief pilots on atmospheric conditions. Other meteorologists worked for companies that design and manufacture meteorological instruments or for firms in aerospace, engineering, utilities, and other industries.

In addition to civilian meteorologists, thousands of members of the Armed Forces did forecasting and other meteorological work.

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, employers prefer to hire those with an advanced degree, and an advanced degree is increasingly necessary for promotion.

For research and college teaching and for many top level positions in other meteorological activities, an advanced degree, preferably in meteorology, is essential. People with graduate degrees in other sciences also may qualify if they have advanced courses in meteorology, physics, mathematics, and chemistry.

In 1982, about 35 colleges and universities offered a bachelor's degree in meteorology or atmospheric science; about 40 schools offered advanced degrees. Many other institutions offered some courses in meteorology. Before selecting a degree program in meteorology, students should investigate the particular emphasis of the program, since many meteorology programs are combined with the study of a related scientific or engineering field.

Beginning meteorologists often start in jobs involving routine data collection, computation, or analysis. Experienced meteorologists may advance to various supervisory or administrative jobs. A few very well qualified meteorologists with a background in business administration may establish their own weather consulting services.

Job Outlook

Employment of meteorologists is expected to grow more slowly than the average for all occupations through the mid-1990's. Little or no growth in employment is expected in the National Weather Service, which employs most meteorologists. Some new jobs will be created

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in private industry as companies recognize the value of having their own weather forecasting and meteorological services but most of the job openings in this very small occupation will arise from the need to replace those who change occupations, retire, or die. Persons with an advanced degree in meteorology should have the best job prospects.

Earnings

The average salary for meteorologists employed by the Federal Government was $34,200 in 1982. In early 1983, meteorologists in the Federal Government with a bachelor's degree and no experience received starting salaries of $13,369 or $16,559 a year, depending on their college grades. Those with a master's degree could start at $16,559 or $20,256; those with the Ph.D. degree, at $24,508 or $29,374. However, the National Weather Service hired few professional level meteorologists in 1983; instead it hired meteorological technicians, most at a starting salary of $13,369. Qualified meteorological technicians in the National Weather Service may eventually be promoted to professional meteorologists.

Related Occupations

Workers in other occupations concerned with the physical environment include forest ecologists, foresters, geologists, geophysicists, oceanographers, range managers, and soil conservationists.

Sources of Additional Information

Information on career opportunities in meteorology is available for 75 cents from:

American Meteorological Society, 45 Beacon St., Boston, Mass. 02108.

For facts about job opportunities with the National Weather Service, contact:

National Weather Service, Personnel Section, Gramax Bldg., 8060 13th St., Silver Spring, Md. 20910.

Physicists

(D.O.T. 023.061-010, -014, .067-010; 041.061-034; 079.021-010 and -014)

Nature of the Work

The flight of the space shuttle, the accuracy of advanced medical instruments, and even the safety of the family car depend on research by physicists. Through systematic observation and experimentation, physicists use mathematical terms to describe the structure of the universe and the interaction of matter and energy. Physicists also develop theories that describe the fundamental forces and laws of nature. Determining the basic laws governing phenomena such as gravity, electromagnetism, and nuclear interactions leads to discoveries and innovations that advance nuclear energy, electronics, communications and aerospace technology, and medical instrumentation.

Astronomy is usually considered a subfield of physics. Astronomers use the principles of physics and mathematics to answer questions about the fundamental nature of the universe, such as its origin and history and the evolution of the solar system.

Most physicists work in research and development. Some do basic research to increase scientific knowledge. For example, they investigate the structure of the atom or the nature of gravity. The equipment that physicists design for their research can often be applied to other areas. For example, lasers (devices that amplify light and emit it in a highly directional, intense beam) are utilized in surgery; microwave devices are used for ovens; and measurement techniques and instruments can detect the kind and number of cells in blood or the amount of mercury or lead in foods.

Many physicists conduct applied research and help develop new devices, products, and processes. For instance, their knowledge of solid-state physics led to the development of transistors and then to the integrated circuits used in calculators and computers. A small number work in inspection, testing, quality control, and other production-related jobs in industry. Some do consulting work.

Almost all astronomers do research. Most of their time is spent analyzing the large quantities of data collected by their own and others' observations and writing scientific papers on the results of their research. Most astronomers spend only a few weeks each year making observations with telescopes, radio telescopes, and other instruments (some in orbiting satellites) that can detect electromagnetic radiation from distant sources. Contrary to the popular image, astronomers almost never actually look through a telescope because photographic and electronic radiation detecting equipment is more effective than the human eye.

Most physicists specialize in one or more branches of the science—elementary-particle physics; nuclear physics; atomic, electron, or molecular physics; physics of condensed matter; optics; acoustics; health physics; plasma physics; and the physics of fluids. Some specialize in a subdivision of one of these branches. For example, subdivisions of solid-state physics include superconductivity, crystallography, and semiconductors. However, since all physics involves the same fundamental principles, several specialties may overlap, and in the course of their careers physicists frequently switch from one subfield to another.

Growing numbers of physicists are specializing in fields such as biophysics, chemical physics, and geophysics in which physics and a related science are combined. Furthermore, the practical applications of physicists' work increasingly have merged with engineering.

Working Conditions

Physicists generally work regular hours in laboratories, classrooms, and offices. Most physicists do not encounter unusual hazards in their work. Astronomers who make observations may need to travel to observation facilities which are usually in remote locations and frequently work at night.

Employment

Physicists held almost 19,000 jobs in 1982. In addition, about an equal number of persons held physics faculty positions in colleges and universities. (See the statement on college and university faculty elsewhere in the *Handbook*.) Private industry employed almost two-thirds of all nonacademic physicists, primarily in companies manufacturing electrical equipment, aircraft and missiles, chemicals, and scientific instruments. Many others worked as researchers in colleges and universities, hospitals, commercial laboratories, and independent research organizations. The Federal Government, mostly the Departments of Defense and Commerce, employed about 3 out of 10 physicists.

Although physicists are employed in all parts of the country, their employment is greatest in areas that have heavy industrial concentrations and large college and university enrollments.

Training, Other Qualifications, and Advancement

Graduate training in physics or a closely related field is almost essential for most entry level jobs in physics and for advancement. The doctorate usually is required for full faculty status at colleges and universities and for industrial or government jobs administering research and development programs. A doctorate is also the usual requirement for a job in astronomy.

Those having master's degrees may qualify for some research jobs in private industry and in the Federal Government as well as for teaching jobs in 2-year colleges. In universities, some teach and assist in research while studying for their Ph.D.

Those having bachelor's degrees may qualify for a few applied research and development jobs in private industry and in the Federal Government. Some are employed as research or teaching assistants in colleges and universities while studying for advanced degrees. Many with undergraduate physics degrees work in engineering and other scientific fields. (See statements on engineers, geologists and geophysicists, programmers, and systems analysts elsewhere in the *Handbook*.)

Almost 800 colleges and universities offer a bachelor's degree in physics. The undergraduate program 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, electromagnetism, electronics, optics, thermodynamics, and atomic and molecular physics. Students also take courses in chemistry and many courses in mathematics.

About 270 colleges and universities offer advanced degrees in physics. In graduate school, the student, with faculty guidance, usually works in a specific subfield of physics. Graduate students, especially candidates for Ph.D. degrees, spend a large portion of their time conducting research.

About 50 universities offer the Ph.D. degree in astronomy. These programs include advanced courses in astronomy, physics, and mathematics. Some schools require that graduate students spend several months working at an

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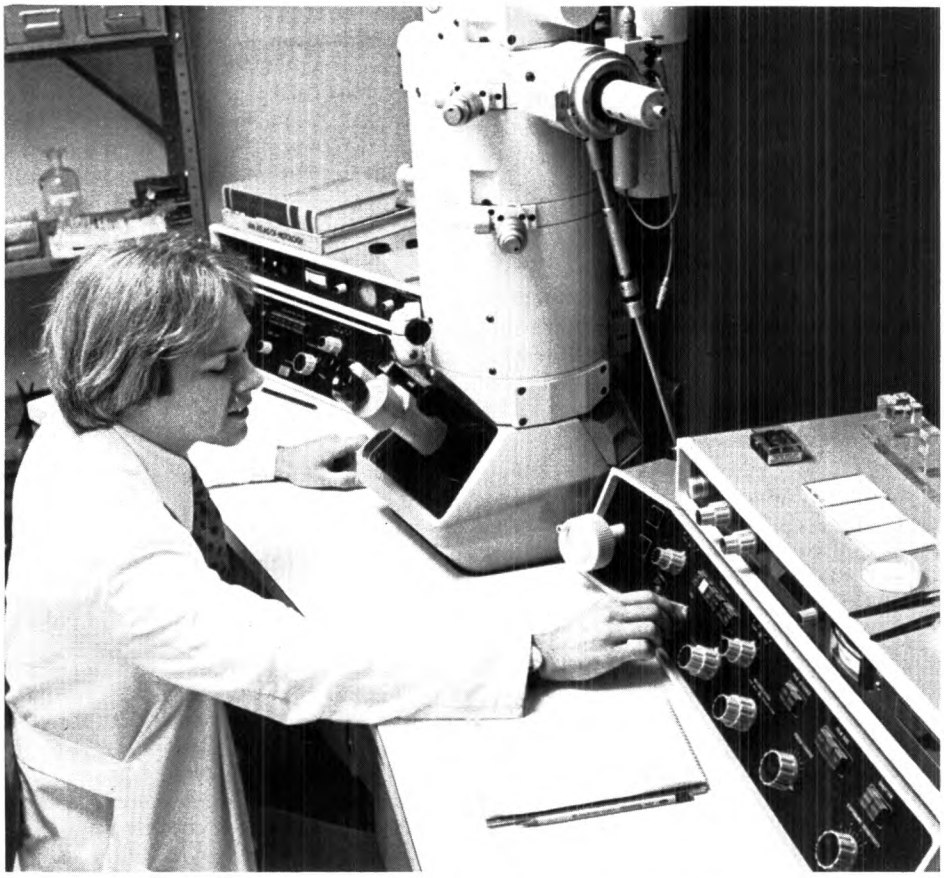

Graduate training in physics or a closely related field is essential for most entry level jobs in physics.

observatory. The usual qualification for entrance to a graduate program in astronomy is a bachelor's degree in astronomy, physics, or mathematics with a physics minor.

Students planning a career in physics should have an inquisitive mind, mathematical ability, and imagination. They should be able to work on their own, since physicists, particularly in basic research, often receive only limited supervision.

Physicists, especially those who hold less than a Ph.D., often begin their careers doing routine laboratory tasks. After some experience, they are assigned more complex tasks and may advance to work as project leaders or research directors. Some work in top management jobs. Physicists who develop new products or processes sometimes form their own companies or join new firms to exploit their own ideas.

Job Outlook

Employment opportunities in physics are expected to be good through 1995 for persons with a doctorate in physics because employment is projected to grow faster than the average for all occupations over the period and the number of graduate degrees awarded annually in physics has been declining since 1970. However, persons seeking jobs in astronomy are expected to continue to encounter competition for the small number of available openings that will occur through 1995. Despite the faster than average growth projected in this occupation, most job openings will arise as physicists transfer to other occupations, retire, or die.

Many physicists work in research and development (R&D). The anticipated increase in R&D expenditures through 1995 should result in increased employment for physicists. If actual R&D expenditure levels and patterns differ significantly from those assumed, however, the outlook would be altered.

Some with advanced degrees in physics will be needed to teach in colleges and universities, but opportunities will be better in private industry. Since little employment growth is expected in colleges and universities, most openings in this area will result from the need to replace those who leave the occupation.

Persons with only a bachelor's degree in physics are not qualified to enter most physicist jobs. However, many with bachelor's degrees in physics find jobs as engineers, technicians, or computer specialists. Others become high school physics teachers. However, they are usually regarded as teachers rather than as physicists. (See the statement on secondary school teachers elsewhere in the *Handbook*.)

Earnings

Median annual earnings of full time physicists were about $33,000 in 1982; the middle 50 percent earned between about $28,000 and $45,000 annually.

According to an American Institute of Physics Survey of 1982 degree recipients, starting salaries for physicists in private industry averaged about $26,500 for those with a master's degree and $34,000 for those with a Ph.D.

Depending on their college records, physicists with a bachelor's degree could start in the Federal Government in early 1983 at either $13,369 or $16,559 a year. Beginning physicists having a master's degree could start at $16,559 or $20,256, and those having the Ph.D. degree could begin at $24,508 or $29,374. Average earnings for all physicists in the Federal Government in 1982 were $38,400 a year.

Starting salaries for physics college and university faculty with the Ph.D. averaged $23,000 in 1982, according to the American Institute of Physics. (See the 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.

Related Occupations

Physics is closely related other scientific occupations such as chemistry, geology, and geophysics. Engineers and engineering and science technicians also use a knowledge of the principles of physics in their work.

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 a pamphlet containing information on careers in astronomy and on schools offering training in the field, send 25 cents to:

Dr. Harry Shipman, Education Officer, American Astronomical Society, University of Delaware, Newark, Del. 19711.

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Life Scientists

Life scientists study living organisms and their life processes, such as growth, reproduction, and behavior. They apply knowledge gained from research to specific goals such as the development of drugs, special varieties of plants, and ways of maintaining a cleaner environment. They are concerned with the origin, preservation, and development of life, from the largest animal to the smallest living cell. Biological scientists study the basic life processes of plants and animals, and agricultural scientists apply their knowledge of biology to agricultural problems. Foresters and conservationists use their knowledge of life science to manage and conserve the natural resources of forests, rangelands, and soil. Detailed information about training requirements and job outlook in these occupations appears in the three statements that follow.

Agricultural Scientists

(D.O.T. 040.061-010, -014, -018, -038, -042, and -058; 041.061-014, -018, and -082)

Nature of the Work

The work done by agricultural scientists has played an important part in making American farm workers the most productive agricultural workers in the world. Agricultural scientists study farm crops and animals and develop ways of improving their quantity and quality. They look for ways to increase yields with less labor, control pests and weeds more effectively, and conserve soil and water. Agricultural science is closely related to biological science in that both involve the study of living organisms; agricultural scientists then apply this knowledge to solving practical problems in agriculture.

About 40 percent of all agricultural scientists manage or administer research and development projects or marketing or production operations in companies that produce agricultural chemicals or machinery. About 20 percent do research and development. Some spend most of their time in laboratories, but some in research and development spend much of their time working with plants and animals in the field. Some agricultural scientists teach in colleges and universities and others work as consultants to business firms or to government.

Agricultural scientists usually specialize in one of the following areas. *Agronomists* (D.O.T. 040.061-010) are concerned with the growth and improvement of field crops. They improve the quality and yield of crops such as corn, wheat, and cotton by developing new growth methods or by controlling diseases, pests, and weeds. Some agronomists may specialize in a particular crop or crop problem.

Animal scientists (D.O.T. 040.061-014) do research on the breeding, feeding, and diseases of domestic farm animals.

Dairy scientists (D.O.T. 040.061-018) and *Poultry scientists* (D.O.T. 040.061-042) conduct research on the breeding, feeding, and management of dairy cattle and poultry.

Horticulturists (D.O.T. 040.061-038) work with orchard and garden plants such as fruit and nut trees, vegetables, and flowers. They seek to improve plant culture methods for the beautification of communities, homes, parks, and other areas as well as for increasing crop quality and yields.

Soil scientists (D.O.T. 040.061-058) study soil characteristics, map soil types, and determine the best types of crops for each soil. They study the responses of various types of soils to fertilizers, tillage practices, crop rotation, and other actions which affect the soil.

Animal breeders (D.O.T. 041.061-014) and *plant breeders* (D.O.T. 041.061-082) develop systems of breeding to develop and improve desirable characteristics of animals and plants.

Apiculturists (D.O.T. 041.061-018) study the culture and breeding of bees.

Working Conditions

Agricultural scientists generally work regular hours in offices, laboratories, or classrooms. Some agricultural scientists spend much time outdoors conducting research on farms or agricultural research stations.

Employment

Agricultural scientists held about 22,000 jobs in 1982. In addition, over 15,000 persons held agricultural science faculty positions in colleges and universities in 1982. (See the statement on college and university faculty elsewhere in the *Handbook*.)

Almost half of all agricultural scientists work for Federal, State, or local governments. Almost 3,000 worked for the Federal Government in 1982, mostly in the Department of Agriculture. Large numbers worked for State governments at State agricultural colleges or agricultural research stations. Almost 10 percent of all agricultural scientists work for agricultural service companies; others work for fertilizer companies, seed companies, and wholesale distribution companies. Over 2,000 agricultural scientists were self-employed in 1982, mainly as consultants.

Training, Other Qualifications, and Advancement

Training requirements for agricultural scientists depend on the specialty and the type of work performed. A Ph.D. degree in an agricultural science specialty is usually required for college teaching, independent research, and for advancement to many administrative and management jobs. A master's degree is sufficient for some jobs in applied research. The bachelor's degree is adequate preparation for some jobs in sales, inspection, and other nonresearch areas, but, in some cases, promotions may be limited for those who hold no higher degree. Those who hold degrees in related sciences such as biology, chemistry, or physics also may enter some agricultural science jobs.

All States have at least one land-grant college which offers agricultural science curriculums. Many other colleges and universities also offer some kind of agricultural science courses. Since some schools may not offer all specialties, students should investigate carefully the course offerings of the schools they are considering. Requirements for advanced degrees usually include fieldwork and laboratory research as well as classroom studies and preparation of a thesis based on independent research.

Agricultural scientists should be able to work independently or as part of a team and must be able to communicate their findings clearly and concisely, both orally and in writing.

Agricultural scientists who have advanced degrees usually begin in research or teaching jobs. With experience, they may advance to jobs such as supervisors of research programs.

Job Outlook

Employment of agricultural scientists is expected to grow more slowly than the average for all occupations through the mid-1990's. Many agricultural scientists work for Federal, State, or local governments where little employment growth is expected. Employment of agricultural scientists involved in research may grow rapidly in private industry as advances such as recombinant DNA now being made in biotechnology are applied to agriculture. In addition to jobs arising from growth in demand for agricultural scientists, job openings will occur as agricultural scientists transfer to other occupations, retire, or die.

Employment opportunities in agricultural science are expected to be better for those with advanced degrees. However, a bachelor's degree in agricultural science is useful for occupations such as farmer or farm manager, cooperative extension service worker, technician, or seed or fertilizer company sales representative. Persons with degrees in agricultural science also work for businesses that deal with farmers such as banks and farm equipment manufacturers.

Earnings

According to the College Placement Council, beginning salary offers for agricultural scientists with the bachelor's degree averaged $16,700 a year in 1982.

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Agricultural scientists examine a newly developed variety of orghum.

In the Federal Government in early 1983, agricultural scientists with a bachelor's degree could start at $13,369 or $16,559 a year, depending on their college records. Those having the master's degree could start at $16,559 or $20,256, depending on their academic records or work experience; and those having the Ph.D. degree could begin at $24,508 or $29,374 a year. Agricultural scientists in the Federal Government averaged about $28,000 a year in 1982.

Related Occupations

The work of agricultural scientists is closely related to that of biologists as well as to other natural scientists such as chemists and physicists. It is also related to agricultural production occupations such as farmer and farm manager and to cooperative extension service workers as well as to foresters and conservation scientists. Certain specialties of agricultural science are also related to other occupations. For example, animal scientists are related to veterinarians, horticulturists to landscape architects, and soil scientists to soil conservationists.

Source of Additional Information

Information on careers in agricultural science is available from:

Higher Education Programs, Agricultural Research Service, U.S. Department of Agriculture, Administration Building, 14th St. and Independence Ave. SW., Washington, D.C. 20250.

American Society of Agronomy, 677 S. Segoe Rd., Madison, Wis. 53711.

Crop Science Society of America, 677 S. Segoe Rd., Madison, Wis. 53711.

Soil Science Society of America, 677 S. Segoe Rd., Madison, Wis. 53711.

For information on careers in horticultural science, send a stamped, self-addressed envelope to:

American Society for Horticultural Science, 701 North Saint Asaph St., Alexandria, Va. 22314.

Information on Federal job opportunities is available from local offices of State employment services and the U.S. Office of Personnel Management or from Federal Job Information Centers located in various large cities throughout the country.

Biological Scientists

(D.O.T. 041.061, except -014, -018, -026, -034, -054, -070, -074, -082, and 090; and .167-010)

Nature of the Work

Biological scientists study all aspects of living organisms and the relationship of animals and plants to their environment. Although many specialize in some area such as ornithology (the study of birds) or microbiology (the study of microscopic organisms), all have in common the study of life.

Many biological scientists are primarily involved in research and development. Some conduct basic research to increase knowledge of living organisms. Others in applied research use this knowledge in activities such as developing new medicines, increasing crop yields, and improving the environment. Those working in laboratories must be familiar with research techniques and the use of laboratory equipment and computers. Not all research, however, is performed in laboratories. For example, a botanist may do research in the volcanic valleys of Alaska to see what plants grow there.

Other biological scientists work in management or administration, for example planning and administering programs for testing foods and drugs and directing activities at zoos or botanical gardens. Some work as consultants to business firms or to government, while others test and inspect foods, drugs, and other products or write for technical publications. (See the statement on technical writers elsewhere in the *Handbook*.) Some work in technical sales and service jobs for companies manufacturing chemicals or other technical products. (See the statements on manufacturers' sales representatives and wholesale trade sales workers elsewhere in the *Handbook*.)

Most biological scientists who come under the broad category of *biologist* (D.O.T. 041.061-030) are further classified by the type of organism they study or by the specific activity they perform.

Anatomists (D.O.T. 041.061-010) study and examine the structure of organisms, from cell structure to the formation of tissues and organs. Many specialize in human anatomy. Research methods may entail dissections or the use of electron microscopes.

Botanists (D.O.T. 041.061-038) deal primarily with plants and their environment. Some study all aspects of plant life, while others specialize in areas such as identification and classification of plants, the structure and function of various plant parts, and the causes and cures of plant diseases.

Embryologists study the development of an animal from a fertilized egg through the hatching process or birth, and the causes of healthy and abnormal development.

Microbiologists (D.O.T. 041.061-058) investigate the growth and characteristics of microscopic organisms such as bacteria, viruses, and molds. *Medical microbiologists* study the relationship between bacteria and disease or the effect of antibiotics on bacteria. Other microbiologists specialize in soil bacteriology (the effect of microorganisms on soil fertility), virology (viruses), or immunology (mechanisms that fight infections).

Pharmacologists (D.O.T. 041.061-074) and *toxicologists* 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

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and organs. Pharmacologists may develop new or improved drugs and medicines.

Physiologists (D.O.T. 041.061-078) study life functions of plants and animals under normal and abnormal conditions. Physiologists may specialize in functions such as growth, reproduction, photosynthesis, respiration, or movement, or in the physiology of a certain area or system of the body.

Zoologists (D.O.T. 041.061-090) study various aspects of animals—their origin, behavior, diseases, and life processes. Some experiment with live animals in controlled or natural surroundings while others dissect dead animals to study their structure. Zoologists are usually identified by the animal group studied—ornithologists (birds), entomologists (insects), mammalogists (mammals), herpetologists (reptiles), and ichthyologists (fish).

Some biological scientists apply their knowledge across a number of areas and may be classified by the functions performed. *Ecologists*, for example, study the relationship between organisms and their environments and the effects of influences such as pollutants, rainfall, temperature, and altitude on organisms. For example, ecologists examine plankton (microscopic water plants and animals) and measure the radioactive content of fish to determine the effects of pollution.

Agricultural scientists, who may also be classified as biological scientists, are included in a separate statement elsewhere in the *Handbook*.

Working Conditions

Biological scientists generally work regular hours in offices, laboratories, or classrooms and usually are not exposed to unsafe or unhealthy conditions. Some biological scientists such as botanists, ecologists, and zoologists may take field trips which involve strenuous physical activity and primitive living conditions.

Biological scientists study living organisms and life processes.

Employment

Biological scientists held about 52,000 jobs in 1982. In addition, an almost equal number of persons held biology faculty positions in colleges and universities. (See the statement on college and university faculty elsewhere in the *Handbook*.)

About 14,000 biological scientists worked for the Federal Government in 1982. Over one-quarter worked for the Department of Agriculture, and about one-fifth worked for the National Institutes of Health. Large numbers also were employed by the Department of the Interior and the Defense Department. State and local governments combined employed about 8,500.

Over 12,000 worked in private industry, mostly in the pharmaceutical, chemical, food, and agricultural services industries in 1982. About 4,000 worked for nonprofit research organizations and foundations; a few were self-employed.

Training, Other Qualifications, and Advancement

The Ph.D. degree generally is required for college teaching, independent research, and for advancement to administrative research positions and other management jobs. A master's degree is sufficient for some jobs in applied research. The bachelor's degree is adequate preparation for some beginning jobs, but promotions often are limited for those who hold no higher degree. 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 can become senior biology technicians, medical laboratory technologists and technicians or, with courses in education, high school biology teachers. (See the statement on secondary school teachers elsewhere in the *Handbook*.) Many with a bachelors degree in biology enter medical, dental, veterinary, or other health profession schools. Some enter a wide range of occuations with little or no connection to biology.

Most colleges and universities offer bachelor's degrees in biological science and many, advanced degrees. Curriculums for advanced degrees in biological science often emphasize a particular area of biological science such as microbiology or botany. Not all universities offer all curriculums. Requirements for advanced degrees usually include fieldwork and laboratory research as well as classroom studies and preparation of a thesis. Biological scientists who have advanced degrees usually begin in research or teaching jobs. With experience, they may advance to jobs such as supervisors of research programs.

Prospective biological scientists should be able to work independently or as part of a team and must be able to communicate their findings clearly and concisely, both orally and in writing. Biological scientists conducting field research in remote areas must have physical stamina.

Job Outlook

Employment of biological scientists is expected to increase faster than the average for all occupations through the mid-1990's due to recent advances in genetic research that should result in new drugs, improved plants, and medical discoveries. Advances in biological technology should result in many additional research jobs for biological scientists in private industry; additional jobs are likely to be created by the production, by biological methods, of products which are presently produced by chemical or other methods. Efforts to preserve the environment should also result in additional employment opportunities. In addition to jobs arising from growth in demand for biological scientists, job openings will occur as some biological scientists transfer to other occuptions, retire, or die.

Employment opportunities for biological scientists are expected to be better for those with advanced degrees since most new jobs will be research oriented. Furthermore, the employment outlook will vary by specialty. Those who have the ability to do research in areas related to the genetic, cellular, and biochemical areas of biology should experience better employment opportunities than those in other specialties. However, many persons with a bachelor's degree in biological science find jobs in occupations such as science or engineering technicians or medical laboratory technologists. Some become high school biology teachers. However, they are usually regarded as teachers rather than biologists. (See the statement on secondary school teachers elsewhere in the *Handbook*.) Others enter a wide range of occupations with little or no connection to biology.

Biological scientists rarely lose their jobs during recessions, since most are employed on long-term research projects or in agriculture, activities which are not much affected by economic fluctuations.

Earnings

According to the College Placement Council, beginning salary offers in private industry in 1982 averaged $16,500 a year for bachelor's degree recipients and $17,000 a year for master's degree recipients in biological science.

In the Federal Government in early 1983, biological scientists having a bachelor's degree could begin at $13,369 or $16,559 a year, depending on their college records. Those having the master's degree could start at $16,559 or $20,256, depending on their academic records or work experience; those having the Ph.D. degree could begin at $24,508 or $29,374 a year. Biological scientists in the Federal Government averaged $31,900 a year in 1982.

Related Occupations

Many occupations are related in some way to biological scientists since they deal with living organisms. These include the conservation occupations of foresters, forestry technicians, range manangers, and soil conservationists, as well as agricultural scientists, biochemists, soil scientists, oceanographers, and life science technicians. The wide array of health occupations are all related to those in the biological

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sciences, as are occupations dealing with raising plants and animals such as farmers and farm workers, florists, and nursery workers.

Sources of Additional Information

General information on careers in biological science is available from:

American Institute of Biological Sciences, 1401 Wilson Boulevard, Arlington, Va. 22209.

American Physiological Society, Education Officer, 9650 Rockville Pike, Bethesda, Md. 20814.

Dr. Carol C. Baskin, Secretary, Botanical Society of America, School of Biological Sciences, University of Kentucky, Lexington, Ky. 40506.

American Society of Zoologists, P.O. Box 2739, California Lutheran College, Thousand Oaks, Calif. 91360.

For information on careers in horticultural science, send a stamped, self-addressed envelope to:

American Society for Horticultural Science, 701 North Saint Asaph St., Alexandria, Va. 22314.

Information on Federal job opportunities is available from local offices of State employment services and the U.S. Office of Personnel Management or from Federal Job Information Centers located in various large cities throughout the country.

Foresters and Conservationists

(D.O.T. 040.061-030, -034, -046, -050, -054, and -062; 169.167-022; and 451.137-010)

Nature of the Work

Forests and rangelands serve a variety of needs: They provide habitats for wildlife, serve as sites for recreational activities, and supply lumber, minerals, and water. Foresters and conservationists manage, develop, and help protect these and other natural resources.

Foresters plan and supervise the growing, protection, and harvesting of trees. They map forest areas, estimate the amount of standing timber and future growth, and manage timber sales. Foresters also protect the trees from fire, harmful insects, and disease. Some foresters also protect wildlife and manage watersheds; develop and supervise camps, parks, and grazing lands, and do research. Foresters in extension work provide information to forest owners and to the general public.

Range managers, also called *range conservationists, range ecologists*, or *range scientists*, manage, improve, and protect rangelands to maximize their use without damaging the environment. 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, wildlife habitats, water from vast watersheds, recreation facilities, and valuable mineral and energy resources. Rangelands also serve as areas for scientific study of the environment. Range managers help ranchers attain optimum livestock production by determining the number and kind of animals to graze, the grazing system to use, and the best season for grazing. At the same time, however, they try to conserve the soil and vegetation for other uses such as wildlife habitats, outdoor recreation, and timber.

Soil conservationists provide technical assistance to farmers, ranchers, and others concerned with the conservation of soil, water, and related natural resources. They develop programs that are designed to get the most productive use of land without damaging it. Soil conservationists do most of their work in the field. Conservationists visit areas with erosion problems, find the source of the problem, and develop a program to combat the erosion.

Foresters and conservationists often specialize in one area of work, such as timber management, outdoor recreation, or forest economics.

Working Conditions

Working conditions for foresters and conservationists vary considerably. Their image as solitary horseback riders, singlehandedly protecting large areas of land far from civilization no longer holds true. Modern foresters and conservationists spend a great deal of time working with people. They deal regularly with landowners, loggers, forestry technicians and aides, farmers, and ranchers.

The work can still be physically demanding, though. Many foresters and conservationists often work outdoors in all kinds of weather, sometimes in remote areas. To get to these areas, they use airplanes, helicopters, and four-wheel drive vehicles. Foresters and conservationists also may work long hours fighting fires or on search-and-rescue missions.

Employment

Foresters and conservationists held nearly 31,000 jobs in 1982. About one-half worked for the Federal Government, primarily in the Department of Agriculture. About one-fourth worked for State governments. The remainder worked in private industry, mainly for lumber, paper, and logging companies, and for local governments and consulting firms. A few were self-employed either as consultants or forest owners.

Most soil conservationists work for the Federal Government, mainly with the Department of Agriculture's Soil Conservation Service.

Although foresters and conservationists work in every State, employment is concentrated in the Western and Southeastern States where many national forests and parks are located and where most of the lumber and pulpwood producing forests are located. Range managers work almost entirely in the Western States where rangeland is located. Soil conservationists, on the other hand, are employed in almost every county in the country.

Training, Other Qualifications, and Advancement

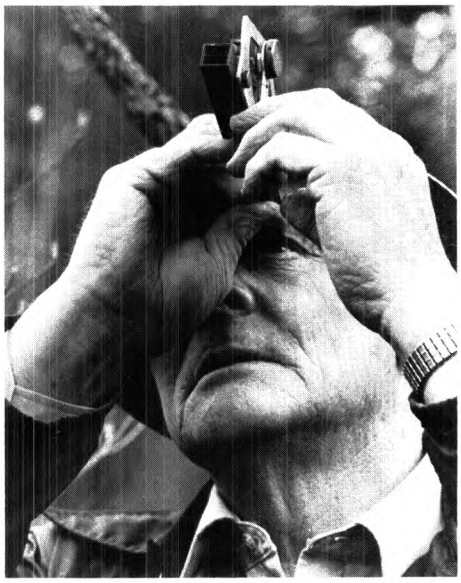
A bachelor's degree in forestry is the minimum educational requirement for professional careers in forestry. However, due to keen job competition and the increasingly complex nature of the forester's work, many employers prefer graduates who hold advanced degrees. Certain jobs such as teaching and research require advanced degrees.

In 1982, about 50 colleges and universities offered bachelor's or higher degrees in forestry; 43 of these were accredited by the Society of American Foresters. Curriculums stress the liberal arts and communications skills as well as technical forestry subjects. Courses in forest economics and business administration supplement the student's scientific and technical knowledge. Many colleges require students to spend one summer in a field camp operated by the college. All schools encourage summer jobs that give experience in forest or conservation work.

A bachelor's degree in range management or range science is the usual minimum educational requirement for range managers. The Federal Government requires at least 42 hours in plant, animal, or soil sciences and natural resources management courses, including at least 18 hours in range management. Graduate degrees in range management generally are required for teaching and research positions and may be helpful for advancement in other jobs.

In 1982, about 18 colleges and universities offered degrees in range management or range science. A number of other schools offered some courses in range management. Specialized range management courses combine plant, animal, and soil sciences with principles of ecology and resource management. Desirable electives include economics, forestry, hydrology, agronomy, wildlife, computer science, and recreation.

Very few colleges and universities offer degrees in soil conservation. Most soil conservationists have degrees in agronomy, agricultural education, or general agriculture; a few



Foresters and conservationists work outdoors in all kinds of weather.

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have degrees in related fields such as wildlife biology, forestry, and range management. Programs of study generally include 30 semester hours in natural resources or agriculture, including at least 3 hours in soils.

In addition to meeting the intellectual demands of forestry and conservation work, foresters and conservationists must enjoy working outdoors, be physically hardy, and be willing to move—often to remote places. They must also be able to work well with people and have good communication skills.

Recent forestry and range management graduates usually work under the supervision of experienced foresters or range managers. After gaining experience, they may advance to more responsible positions. In the Federal Government, an experienced forester may supervise an entire forest area, and may advance to regional forest supervisor or to a top administrative position. In private industry, foresters start by learning the practical and administrative aspects of the business. Many foresters work their way up to top managerial positions within their companies.

Soil conservationists usually begin working within one county and with experience may advance to the area and State level. Also, soil conservationists can transfer to related occupations such as farm management advisors or land appraisers.

Job Outlook

Employment of foresters and conservationists is expected to grow more slowly than the average for all occupations through the mid-1990's. Employment should continue to grow faster in private industry than in Federal and State governments where budget limitations are likely to restrain growth. More foresters will be needed in private industry to ensure an increasing output of forest products. Private owners of timberland also are likely to employ more foresters as they recognize the need for—and the higher profitability of—improved forestry and logging practices. The growing demand for meat, wildlife habitats, recreation, and water, as well as continued environmental concerns should stimulate the need for more range managers. However, the employment of soil conservationists is expected to change little through the mid-1990's since the Federal Government, the major employer, is not expected to increase its employment of soil conservationists. Besides job openings created by growth in employment, many foresters and conservationists will be needed to replace those who retire, transfer to other occupations, or die.

Earnings

Most graduates entering the Federal Government as foresters, range managers, or soil conservationists in early 1983 with just a bachelor's degree started at $13,369 a year, although those with high grades or a master's degree could start at $16,559. In 1982, the average Federal salary for foresters was about $27,900; for range conservationists, about $23,700; and for soil conservationists, about $26,000.

Related Occupations

Foresters and conservationists are not the only workers concerned with managing, developing, and protecting natural resources. Other workers with similar responsibilities include agricultural scientists, agricultural engineers, biological scientists, farmers, farm managers, ranchers, and wildlife managers.

Sources of Additional Information

General information about the forestry profession and lists of schools offering education in forestry are available from:

Society of American Foresters, 5400 Grosvenor Lane, Bethesda, Md. 20814.

American Forestry Association, 1319 18th St. NW., Washington, D.C. 20036.

Information about a career as a range manager as well as a list of schools offering training is available from:

Society for Range Management, 2760 W. 5th Ave., Denver, Colo. 80204.

For information about career opportunities in the Federal Government, contact:

Bureau of Land Management, Denver Service Center, Federal Center Building 50, Denver, Colo. 80225.

U.S. Department of Agriculture, Forest Service, P.O. Box 2417, Washington, D.C. 20013.

U.S. Department of Agriculture, Soil Conservation Service, P.O. Box 2890, Washington, D.C. 20013.

OTHER NATURAL SCIENCE AND MATHEMATICAL RELATED OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Financial analysts	Conduct statistical analyses of information affecting investment programs of public, industrial and financial institutions and private individuals.	19,000	Faster than average
Medical scientists	Includes Medical Scientists such as Physicians, Dentists, Public Health Specialists, Pharmacists and Medical Pathologists who are concerned with the understanding of human diseases and improvement of human health, and are engaged in clinical investigation or other research, production, technical writing, or related activities.	7,200	Faster than average

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Social Scientists, Social Workers, Religious Workers, and Lawyers

Many of the workers described in this section of the *Handbook* are concerned with the social needs of people. For example, clinical psychologists help the mentally or emotionally disturbed adjust to life through behavior modification programs and other techniques. Social workers in a wide range of settings address the needs of individuals, families, groups, and communities. Their work may involve anything from helping an elderly person adjust to life in a nursing home to organizing fund raising for community social welfare activities. Recreation workers help people enjoy their nonworking hours by organizing activities in camps, community centers, playgrounds, and other settings. Religious workers counsel people in their faith and provide spiritual and moral leadership within their communities. Lawyers advise clients of their legal rights and obligations and suggest particular courses of action in personal and business matters.

People in these types of jobs must be tactful, compassionate, and sensitive to the needs of others. Their manner must inspire trust and confidence. In fact, religious workers, lawyers, and others are bound by strict rules of ethics and may not disclose matters discussed in confidence with clients. Patience also is a vital personal characteristic as clients often are confused, hesitant, fearful, or angry. They may not fully understand their circumstances and may have difficulty expressing themselves.

Other workers described in this section conduct basic and applied research in the social sciences. They deal primarily with data and things rather than people. They use established methods to assemble a body of fact and theory that contributes to human knowledge. Social scientists investigate all aspects of human society—from an anthropologist studying the origins of the human race or a historian studying an ancient civilization to a political scientist analyzing the results of presidential elections or a market research analyst conducting a survey of consumer preferences. Through their studies and analyses, social scientists help educators, government officials, business executives, and others to address broad social, economic, and political questions.

The ability to think logically and methodically and to analyze data is essential to social science research. Other important personal characteristics include objectivity, openmindedness, and systematic work habits. Good oral and written communication skills also are necessary.

While training and educational requirements vary among the occupations in this cluster, advanced training leading to a doctoral or equivalent professional degree is often necessary for employment in certain settings and for "professional" recognition. Even in occupations for which entry is possible with a bachelor's degree, for example, advancement prospects may be quite limited for those without graduate training. These occupations require more training than most occupations in the *Handbook*.

The *Handbook* statements that follow include more detailed information on the nature of the work and training requirements. Information on employment, earnings, working conditions, and job outlook also is presented.

Lawyers

(D.O.T. 110)

Laws affect every aspect of our society. They regulate the entire spectrum of relationships among individuals, groups, businesses, and governments. They define rights as well as restrictions, covering such diverse activities as judging and punishing criminals, granting patents, drawing up business contracts, paying taxes, settling labor disputes, constructing buildings, and administering wills.

Because social needs and attitudes are continually changing, the legal system that regulates our social, political, and economic relationships also changes. Lawyers, also called attorneys, link the legal system and society. To perform this role, they must understand the world around them and be sensitive to the numerous aspects of society that the law touches. They must comprehend not only the words of a particular statute, but the human circumstances it addresses as well.

As our laws grow more complex, the work of lawyers takes on broader significance. Laws affect our lives in new ways as the legal system takes on regulatory tasks in areas such as transportation, energy conservation, consumer protection, and social welfare. Lawyers interpret these laws, rulings, and regulations for individuals and businesses.

Nature of the Work

In our society, lawyers act as both advocates and advisors. As advocates, they represent opposing parties in criminal and civil trials by presenting arguments that support each side in a court of law. As advisors, lawyers counsel their clients as to their legal rights and obligations and suggest particular courses of action in business and personal matters.

Whether acting as advocates or advisors, nearly all attorneys have certain activities in common. Probably the most fundamental activities are the interpretation of the law and its application to a specific situation. This requires in-depth research into the purposes behind certain laws and into judicial decisions that have applied those laws to circumstances similar to those currently faced by the attorney. Based on this research, the attorney helps clients decide what actions would best serve their interests.

Lawyers must deal with people in a courteous, efficient manner and not disclose matters discussed in confidence with clients. Because lawyers hold positions of great responsibility, they must always adhere to strict rules of ethics.

Finally, most lawyers write reports or briefs which must communicate clearly and precisely. The more detailed aspects of a lawyer's job depend upon his or her field and position.

While all licensed attorneys are allowed to represent parties in court, some appear in court more frequently than others. A few lawyers specialize in trial work. These lawyers usually have an exceptional ability to think quickly, speak with ease and authority, and are thoroughly familiar with courtroom strategy. Trial lawyers still spend considerable time outside the courtroom conducting research, interviewing clients and witnesses, and handling other details in preparation for trial.

Although most lawyers deal with many different areas of the law, a significant number concentrate on one branch of law, such as admiralty, probate, or international law. Communications lawyers, for example, may represent radio and television stations in their dealings with the Federal Communications Commission. They help established stations prepare and file license renewal applications, employment reports, and other documents required by the FCC on a regular basis. They also keep their clients informed of changes in FCC regulations. Communications lawyers help individuals or corporations buy or sell a station or establish a new one.

Lawyers who represent public utilities before the Federal Power Commission and other regulatory agencies handle matters involving utility rates. They develop strategy, arguments, and testimony; prepare cases for presentation; and argue the case. These lawyers also inform clients about changes in regulations and give advice about the legality of their actions.

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Still other lawyers advise insurance companies about the legality of insurance transactions. They write insurance policies to conform with the law and to protect companies from unwarranted claims. They review claims filed against insurance companies and represent companies in court.

Lawyers in private practice may concentrate on areas such as litigation, wills, trusts, contracts, mortgages, titles, and leases. Some manage a person's property as trustee or see that provisions of a client's will are carried out as executor. Others handle only public interest cases—civil or criminal—which have a potential impact extending well beyond the individual client. Attorneys hope to use these cases as a vehicle for legal and social reform.

A single client may employ a lawyer full time. Often known as house counsel, this lawyer usually advises a company about legal questions that arise from business activities. Such questions might involve patents, government regulations, a business contract with another company, or a collective bargaining agreement with a union.

Attorneys employed at the various levels of government constitute still another category. Criminal lawyers may work for a State attorney general, a prosecutor or public defender, or a court. At the Federal level, attorneys may investigate cases for the Department of Justice or other agencies. Lawyers at every government level help develop laws and programs, draft legislation, establish enforcement procedures, and argue cases.

Other lawyers work for legal aid societies—private, nonprofit corporations established to serve poor people in particular areas. These lawyers generally handle civil rather than criminal cases.

A relatively small number of licensed attorneys work in law schools. Most are faculty members who specialize in one or more subjects, while others serve as administrators. Some work full time in nonacademic settings and teach part time. (For additional information, see the statement on college and university faculty elsewhere in the *Handbook*.)

Lawyers do research on how laws have been interpreted and applied in the past.

Working Conditions

Lawyers do most of their work in offices and courtrooms. They sometimes meet in clients' homes or places of business and, when necessary, in hospitals or prisons. They frequently travel to attend meetings; to gather evidence; and to appear before courts, legislative bodies, and other authorities.

Salaried lawyers in government and private firms generally have structured work schedules. Independent lawyers may work irregular hours while conducting research, conferring with clients, or preparing briefs during nonoffice hours. Lawyers generally work long hours and are under particularly heavy pressure when a case is being tried. Preparation for court includes keeping abreast of the latest laws and judicial decisions.

Although work generally is not seasonal, the work of tax lawyers may be an exception. Since lawyers in private practice can determine their own workload, many stay in practice well beyond the usual retirement age.

Employment

Lawyers held about 465,000 jobs in 1982. About three-fourths of them practiced privately, either in law firms or in solo practices. Most of the remaining lawyers held positions in government, primarily at the State and local levels. In the Federal Government, lawyers are concentrated in the Departments of Justice, Treasury, and Defense, but they work for other Federal agencies as well. Others are employed as house counsel by public utilities, transportation firms, banks, insurance companies, real estate agencies, manufacturing firms, welfare and religious organizations, and other business firms and nonprofit organizations. Some salaried lawyers also have independent practices; others do legal work part time while in another occupation.

Training, Other Qualifications, and Advancement

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. Lawyers who have been admitted to the bar in one State occasionally may be admitted in another State without taking an examination if they meet that State's standards of good moral character and have a specified period of legal experience. Federal courts and agencies set their own qualifications for those practicing before them.

To qualify for the bar examination in most States, an applicant must complete at least 3 years of college and graduate from a law school approved by the American Bar Association (ABA) or the proper State authorities. (ABA approval signifies that the law school meets certain standards developed by the association to promote quality legal education. With certain exceptions, graduates of nonapproved schools generally are restricted to taking the bar examination and practicing in the State in which the school is located.) A few States accept the study of law in a law office or in combination with study in a law school; only California accepts the 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.

Although there is no nationwide bar exam, 46 States and the District of Columbia participate in the Multistate Bar Examination (MBE). The MBE, covering issues of broad interest, is given in addition to the State bar exam. States vary in their treatment of MBE scores.

The required college and law school education usually takes 7 years of full-time study after high school—4 years of undergraduate study followed by 3 years in law school. Although some law schools accept a very small number of students after 3 years of college, most require applicants 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 or part-time divisions which usually require 4 years of study. In 1981, about one-eighth of all graduates of ABA-approved schools were part-time students.

Preparation for a career as a lawyer really begins in college. Although there is no recommended "prelaw" major, the choice of an undergraduate program is important. Certain courses and activities are desirable because they give the student the skills needed to succeed both in law school and in the profession. Essential skills—the ability to write, to read and analyze, to think logically, and to communicate verbally—are learned during high school and college. An undergraduate program that cultivates these skills while broadening the student's view of the world is best. Majors in the social sciences, natural sciences, and humanities all are suitable, although a student should not specialize too narrowly. Regardless of one's major, courses in English, foreign language, public speaking, government, philosophy, history, economics, mathematics, and computer science, among others, are highly recommended.

Students interested in a particular aspect of law may find related courses helpful; for example, engineering and science courses for the prospective patent attorney, and accounting for the future tax lawyer. In addition, typing is advisable simply for convenience in law school.

Acceptance by most law schools depends on the applicant's ability to demonstrate an aptitude for the study of law, usually through good grades and the Law School Admission Test (LSAT), administered by the Educational Testing Service. The quality of the applicant's undergraduate school, any prior work experience, and sometimes a personal interview are also taken into consideration. In 1982, the American Bar Association had approved 173 law schools. Others were approved by State authorities only.

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Competition for admission to law school is intense. Enrollments rose very rapidly during the early 1970's, with applicants far outnumbering available seats. Competition for admission remains stiff, especially in more prestigious law schools. Although enrollments are expected to level off during the 1980's and early 1990's, admission to law school will remain the first of several hurdles for prospective lawyers.

During the first year or year and a half of law school, students generally study fundamental courses such as constitutional law, contracts, property law, judicial procedures, and legal writing. In the remaining time, they may elect specialized courses in fields such as tax, labor, or corporation law. Practical experience often is acquired by participation in school-sponsored legal aid or legal clinic activities, in the school's moot court competitions in which students conduct appellate arguments, in practice trials under the supervision of experienced lawyers and judges, and through writing on legal issues for the school's law journals.

In 1982, law students in 28 states and the District of Columbia were required to pass the Multistate Professional Responsibility Examination (MPRE), which tests their knowledge of the ABA codes on professional responsibility and judicial conduct. The MPRE may be taken during law school, usually after completing a course on legal ethics.

A number of law schools have clinical programs where students gain legal experience through practice trials and law school projects under the supervision of practicing lawyers and law school faculty. Law school clinical programs might include work in legal aid clinics, for example, or on the staff of legislative committees. Part-time or summer clerkships in law firms, government agencies, and corporate legal departments also provide experience that can be extremely valuable later on. Such training can provide references or lead directly to a job after graduation, and can help students decide what kind of practice best suits them. Clerkships also may be an important source of financial aid.

Graduates receive the degree of *juris doctor* (J.D.) or *bachelor of law* (LL.B.) as the first professional degree. Advanced law degrees are desirable for those planning to specialize, do research, or teach. Some law students pursue joint degree programs, which generally require an additional year or more. Joint degree programs are offered in a number of areas, including law and business administration and law and public administration.

After graduation, lawyers must keep informed about legal and nonlegal developments that affect their practice. An attorney representing electronics manufacturers, for example, must follow trade journals and the latest Federal regulations. Attorneys in the Department of State must remain well versed in current events and international law, while divorce lawyers read about the changing role of the family in modern society. Many law schools and State and local bar associations provide continuing education courses that help lawyers stay abreast of recent developments.

The practice of law involves a great deal of responsibility. Persons planning careers in law should like to work with people and be able to win the respect and confidence of their clients, associates, and the public. Integrity and honesty are vital personal qualities. Perseverance and reasoning ability are essential to analyze complex cases and reach sound conclusions. At times, lawyers need creativity when handling new and unique legal problems.

Most beginning lawyers start in salaried positions. Newly hired salaried attorneys usually act as research assistants to experienced lawyers or judges. After several years of progressively responsible salaried employment, many lawyers are admitted to partnership in their firm, or go into practice for themselves. Some lawyers, after years of practice, become judges.

Some persons use their legal training in administrative or managerial positions in various departments of large corporations. A transfer from a corporation's legal department to another department often is viewed as a way to gain administrative experience and rise in the ranks of management.

Job Outlook

Despite strong growth in the demand for lawyers, the sizable number of law school graduates entering the job market each year has created keen competition for jobs. Over the last decade, the number of law school graduates more than doubled, as shown in the accompanying chart. While the number of graduates is expected to level off through the mid-1990's, competition for salaried jobs will remain intense. New graduates, together with qualified lawyers seeking to transfer from other occupations, should continue to outnumber salaried openings, particularly in large metropolitan areas.

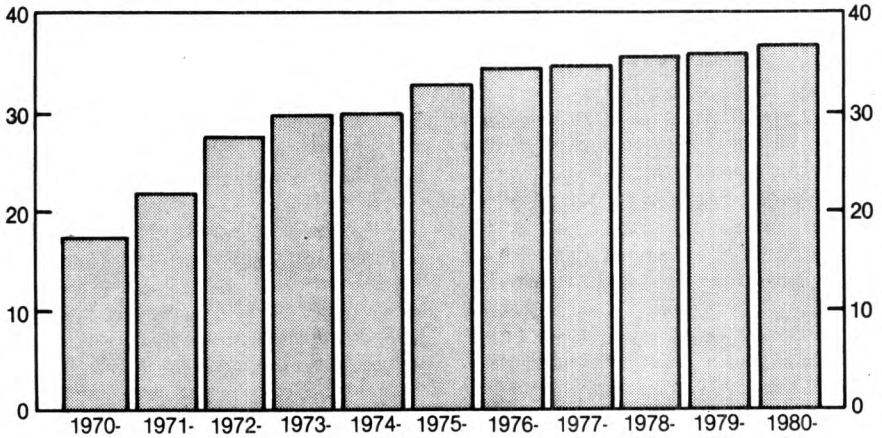
Employment of lawyers grew very rapidly during the last decade. Faster-than-average growth is expected to continue through the mid-1990's as increased population and business activity help sustain the strong demand for attorneys. This demand also will be spurred by growth of legal action in such areas as consumer protection, the environment, and safety, and an anticipated increase in the use of legal services by middle-income groups through legal clinics and prepaid legal service programs. As during the 1970's, employment growth will be concentrated in private salaried jobs. The number of self-employed lawyers is expected to grow slowly as it becomes increasingly difficult to establish a profitable small practice, due to the growing complexity of law, which encourages specialization, and the cost of maintaining up-to-date legal research materials.

Turnover of jobs in this occupation is very low because its members are well paid and enjoy considerable social status, and a substantial educational investment is required for entry. Nevertheless, most job openings will stem from the need to replace lawyers who transfer to other occupations, retire, or stop working for other reasons.

Employers will continue to be selective in hiring new lawyers. Graduates of prestigious 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, or as law clerks for judges. Graduates of less prominent schools and those with lower scholastic ratings will experience some difficulty in finding salaried jobs. Some graduates may be forced to accept positions for which they are overqualifed or in areas outside their field of interest. An increasing proportion will enter fields where legal training is an asset but not normally a requirement. For example, banks, insurance firms, real estate companies, government agencies, and other organizations seek law graduates to fill many administrative, managerial, and business positions.

Due to the competition for jobs, a law graduate's geographic mobility and experience assume greater importance. The willingness to relocate may be an advantage in getting a job.

Law school graduates more than doubled during the 1970's, creating keen competition for jobs.



SOURCE: National Center for Education Statistics

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In addition, employers increasingly seek graduates who have advanced law degrees and experience in a particular field such as tax, patent, or admiralty law.

Establishing a new practice probably will continue to be best in small towns and expanding suburban areas, as long as an active market for legal services already exists. 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. Nevertheless, starting a new practice will remain an expensive and risky proposition that should be weighed carefully. Salaried positions will continue largely in urban areas where government agencies, law firms, and big corporations are concentrated.

Some lawyers are adversely affected by cyclical swings in the economy. During recessions, the demand for some discretionary legal services, such as planning estates, drafting wills, and handling real estate transactions, declines. Also, corporations are less likely to litigate cases when declining sales and profits result in budgetary restrictions. Although few lawyers actually lose their jobs during these times, earnings may decline for many. Some corporations and law firms will not hire new attorneys until business improves. Several factors, however, mitigate the overall impact of recessions on lawyers. During recessions, individuals and corporations face other legal problems, such as bankruptcies, foreclosures, and divorces, that require legal action. Furthermore, the continuous emergence of new laws and legal interpretations will create new opportunities for lawyers.

Earnings

In 1982, starting salaries for recent law school graduates ranged from $10,000 a year in some small firms to over $40,000 in some larger ones. Beginning attorneys in private industry averaged about $28,000 in 1983. In the Federal Government, annual starting salaries for attorneys in 1982 were about $19,700 or $23,800, depending upon academic and personal qualifications. Factors affecting the salaries offered to new graduates include: Academic record; type, size, and location of employers; and the desired specialized educational background. The field of law makes a difference, too. Patent lawyers, for example, generally are among the highest paid attorneys.

Salaries of experienced attorneys also vary widely according to the type, size, and location of the employers. The average salary of the most experienced lawyers in private industry in 1983 was nearly $85,000. General attorneys in the Federal Government averaged around $39,200 a year in 1982; the relatively small number of patent attorneys in the Federal Government averaged around $44,900.

Lawyers starting their own practice may need to work part time in other occupations during the first years to supplement their income. Lawyers on salary receive increases as they assume greater responsibility. Incomes of lawyers in practice usually grow as their practices develop. Lawyers who are partners in law firms generally earn more than those who practice alone.

Related Occupations

Legal training is useful in many other occupations. Some of these are arbitrators, hearing examiners, journalists, patent agents, title examiners, legislative assistants, lobbyists, FBI special agents, political office holders, and corporate executives.

Sources of Additional Information

Persons considering law as a career will find information on law schools and prelaw study in the *Prelaw Handbook*, published annually by Law School Admission Services, Box 2000, Newtown, Pa. 18940. Copies may be available in public or school libraries. In addition, many colleges and universities have a prelaw advisor who counsels undergraduates about their course work, the LSAT, law school applications, and other matters.

Information on law schools, financial aid for law students, and law as a career is available from:

Information Services, American Bar Association, 1155 East 60th St., Chicago, Ill. 60637. (There may be a slight charge for publications.)

For information on the placement of law graduates and the legal profession in general, contact:

National Association for Law Placement, Administrative Office, Joseph Merrick Jones Hall, Tulane Law School, New Orleans, La. 70118.

Information on legal education is available from:

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

For advice on financial aid, contact a law school financial aid officer.

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.

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Social Scientists and Urban Planners

Nature of the Work

Social scientists study all aspects of human society—from the distribution of products and services to newly formed religious groups or plans for modern mass transportation systems. Social science research provides insights that help us understand the many different ways in which individuals and groups make decisions, exercise power, or respond to change. Through their studies and analyses, social scientists and urban planners assist educators, government officials, business leaders, and others to solve social, economic, and environmental problems.

Research is a basic activity for many social scientists. They use established methods to assemble a body of fact and theory that contributes to human knowledge. Applied research usually is designed to produce information that will enable people to make better decisions or manage their affairs more effectively. Interviews and surveys are widely used to collect facts, opinions, or other information. Data collection takes many other forms, however, including living and working among the people studied; archeological investigations; the analysis of historical records and documents; experiments with human subjects or lower animals in a psychological laboratory; and the administration of standardized tests and questionnaires.

Regardless of their field of specialization, social scientists are concerned with some aspect of society, culture, or personality.

Anthropologists study the way of life, remains, language, and physical characteristics of people in all parts of the world; they compare the customs, values, and social patterns of different cultures. Anthropologists generally concentrate in 1 of 4 subfields: Cultural anthropology, archeology, linguistics, or physical anthropology. Most anthropologists specialize in *cultural anthropology*, studying the customs, cultures, and social lives of groups in a wide range of settings from nonindustrialized societies to modern urban cultures. *Archeologists* study cultures from artifacts and other remains in the ground. *Linguistic anthropologists* study the role of language in various cultures. *Physical anthropologists* study the evolution of the human body and look for the earliest evidence of human life.

Economists study the way we use our resources to produce goods and services. They compile and analyze data that explain the costs and benefits of allocating resources in different ways. Most economists are concerned with the practical applications of economic policy in a particular area, such as finance, labor, agriculture, transportation, energy, or health. Others develop theories to explain economic problems such as unemployment or inflation.

Geographers study the distribution and location of various characteristics of the earth's surface. Geographers specialize, as a rule. Economic geographers deal with the geographic distribution of an area's economic activities. Political geographers are concerned with the relationship of geography to politics. Physical geographers study the physical characteristics of the earth. Urban geographers study cities and metropolitan areas while regional geographers study the physical, climatic, economic, political, and cultural characteristics of a particular region or area, which may range in size from a river basin to a State, country, or continent. Cartographers design and construct maps and charts. Medical geographers study the effect of the environment on health.

Historians describe and analyze past events through writing and research. Historians usually specialize in a specific country or geographic region; in a particular time period; or in a particular field, such as social, intellectual, political, or diplomatic history. Archivists and curators—who work for museums, special libraries, or historical societies—identify, classify, and preserve historical documents and artifacts. Biographers collect detailed information on individuals. Genealogists trace family histories, and other historians help preserve and protect historic buildings and sites.

Market research analysts conduct telephone, personal, or mail surveys and other research to determine public preferences for a wide variety of products and services. They sometimes offer samples of a product to find out whether potential customers are pleased with the design. They analyze the data and summarize their results in reports which are used by business, industry, and government in formulating policy.

Political scientists investigate the ways in which political power is gained and used. They study a wide range of subjects such as Soviet-American relations, the beliefs and institutions of nations in Asia and Africa, the politics of a New England town or a major metropolis, and the decisions of the U.S. Supreme Court. Studying topics such as public opinion, political decisionmaking, and ideology, they analyze the structure and operation of governments as well as informal political entities. Depending on the topic under study, a political scientist might conduct a public opinion survey, analyze election results, or compare the principal features of various tax proposals.

Psychologists study human behavior and use their expertise to counsel or advise individuals or groups. Their research also assists advertisers, politicians, and others interested in influencing or motivating people. While clinical psychology is the largest specialty, psychologists specialize in many other fields such as counseling, experimental, social, or industrial psychology.

Sociologists analyze the behavior of groups or social systems such as families, neighborhoods, or clubs. Sociologists may specialize in a particular field such as criminology, rural sociology, or medical sociology.

Urban and regional planners develop comprehensive plans and programs for the use of land for industrial and public sites. Planners prepare for situations that are likely to develop as a result of population growth or social and economic change.

Working Conditions

Most social scientists have regular hours. While working alone behind a desk, they read and write research reports. Many experience the pressures of deadlines and tight schedules, and sometimes must work overtime. Their routine may be interrupted by telephone calls, letters to answer, special requests for information, meetings, or conferences. Travel may be necessary to collect information or attend meetings. Social scientists on foreign assignment must adjust to unfamiliar cultures and climates.

Some social scientists do fieldwork. For example, anthropologists and archeologists often must travel to remote areas to live among the people they study or stay for long periods at the site of their excavations.

Employment

Social scientists held over 200,000 jobs in 1982. They work for a wide range of employers including government agencies; research organizations and consulting firms; labor unions, trade associations, and nonprofit organizations; hospitals and other health facilities; and business firms. In addition, many persons with graduate training in a social science discipline, usually a doctoral degree, are employed by colleges and universities where they characteristically combine teaching with research and consulting. (For more information, see the *Handbook* statement on college and university faculty.) As a source of employment, the academic world is more important for graduates in sociology or political science than for graduates in urban and regional planning or psychology.

Training, Other Qualifications, and Advancement

The Ph.D. or equivalent degree is a minimum requirement for most positions in colleges and universities and is important for advancement to many top-level nonacademic posts. Graduates with master's degrees have more limited professional opportunities, although the situation varies a great deal by field. For example, job prospects for master's degree holders in urban and regional planning are brighter than

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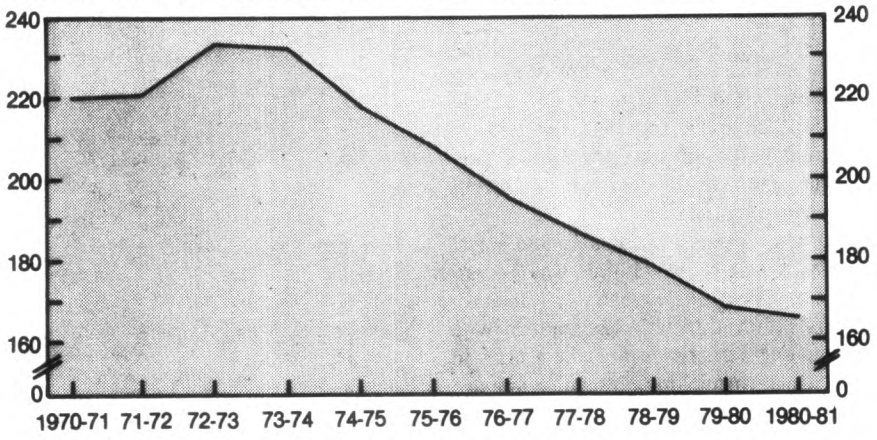
The number of social science graduates has declined since the early 1970's in response to shrinking demand.



SOURCE: National Center for Education Statistics

for master's degree holders in sociology. Bachelor's degree holders have even more limited opportunities and in most social science occupations do not qualify for "professional" positions. The bachelor's degree does, however, provide a suitable background for many different kinds of "junior professional" jobs, such as research assistant, administrative aide, or management trainee.

Training in statistics and mathematics is essential for most social scientists. Indeed, the widespread use of mathematical and other quantitative research methods in economics, political science, market research, experimental psychology, and other fields is among the most important trends in recent times. The ability to use computers for research purposes is a "must" in many disciplines.

Depending on their jobs, social scientists and urban planners may need a wide range of personal characteristics. Because they constantly seek new information about people, things, and ideas, intellectual curiosity and creativity are two fundamental personal traits. The ability to think logically and methodically is important to a political scientist comparing the merits of various forms of government. The ability to analyze data is important to an economist studying proposals to reduce budget deficits in government. Objectivity, openmindedness, and systematic work habits are important in all kinds of social science research. Perseverance is essential for an anthropologist, who might spend years accumulating artifacts from an ancient civilization. Emotional stability and sensitivity are vital to a clinical psychologist working with mental patients. And, of course, written and oral communication skills are essential to all these workers.

Job Outlook

Employment of social scientists is expected to grow about as fast as the average for all occupations through the mid-1990's. Most job openings, however, will result from the need to replace social scientists who transfer to other occupations, retire, or stop working for other reasons.

However, the number of degrees awarded in the social sciences is expected to exceed job openings and result in competition for jobs. Prospects are better in some disciplines than in others. As in the past, top graduates of leading universities will have a decided advantage in competing for jobs, especially for the limited number of academic jobs. Other considerations that affect employment opportunities in these occupations include degree level; field of specialization; specific skills and experience; desired work setting; salary requirements; and geographic mobility.

The predominance of academic employment in such disciplines as anthropology, history, political science, and sociology may cause severe problems for these specialists through the mid-1990's as college enrollments decline. Compared to the past, few academic positions will be available, and efforts are continuing to acquaint new graduates in these fields with alternative or nontraditional career opportunities in areas such as program administration and evaluation.

Earnings

According to the College Placement Council, persons with a bachelor's degree in marketing and distribution received offers averaging about $16,000 a year in 1982. Economics majors received offers averaging around $18,500, while other social science majors averaged around $15,000. Social science majors with a master's degree received starting offers that averaged $18,500.

According to a 1981 National Research Council survey, the median annual salary of doctoral historians was about $27,000. Doctoral psychologists and other social scientists earned about $30,900.

In the Federal Government, social scientists with a bachelor's degree and no experience could start at $13,000 or $16,100 a year in 1982, depending on their college records. Those with a master's degree could start at $19,700, and those having a Ph.D. degree could begin at $23,800. The average salary of all social scientists working for the Federal Government was about $34,000.

Related Occupations

A number of fields related to social science are covered elsewhere in the *Handbook*. See the statements on lawyers, statisticians, mathematicians, programmers, systems analysts, reporters and correspondents, social workers, religious workers, college and university faculty, and vocational and education counselors.

Sources of Additional Information

For general information concerning the social science occupations, contact:

Consortium of Social Science Occupations, 1733 Massachusetts Ave. NW., Suite 300, Washington, D.C. 20036.

More detailed information about economists, psychologists, sociologists, and urban and regional planners is presented in the *Handbook* statements that follow this introductory statement.

For information about careers (including opportunities for contract work in archeology and historic preservation and State employment opportunities for archeologists), job openings, grants and fellowships, schools that offer training in anthropology, and "Getting a Job Outside the Academy" (special publication no. 14), contact:

The American Anthropological Association, 1703 New Hampshire Ave. NW., Washington, D.C. 20009.

Additional information on careers and job openings for geographers, and on schools offering various programs in geography may be obtained from:

Association of American Geographers, 1710 16th St. NW., Washington, D.C. 20009.

For additional information on careers in cartography, surveying, and geodesy, contact:

American Congress on Surveying and Mapping, 210 Little Falls St., Falls Church, Va. 22046.

For more information on careers and a list of schools that offer courses in photogrammetry and satellite data interpretation, contact:

American Society of Photogrammetry, 210 Little Falls St., Falls Church, Va. 22046.

Additional information on careers and job openings for historians and on schools offering various programs in history is available from:

American Historical Association, 400 A St. SE., Washington, D.C. 20003.

For information on careers and schools offering degree programs and courses in historic preservation, contact:

National Trust for Historic Preservation, 1785 Massachusetts Ave. NW., Washington, D.C. 20036.

General information on careers for historians is available from:

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Organization of American Historians, Indiana University, 112 North Bryan St., Bloomington, Ind. 47401.

For additional information on careers for historians, send a self-addressed, stamped envelope to:

American Association for State and Local History, 708 Berry Rd., Nashville, Tenn. 37204.

For information on museum careers and museum studies programs, contact:

Office of Museum Programs, Arts and Industries Building, Room 2235, Smithsonian Institution, Washington, D.C. 20560.

For information on training for museum careers, contact:

American Association of Museums, 1055 Thomas Jefferson St. NW., Washington, D.C. 20007.

A pamphlet, *Careers in Marketing* (Monograph Series No. 4), may be obtained from:

American Marketing Association, 250 Wacker St., Chicago, Ill. 60606.

The American Political Science Association, 1527 New Hampshire Ave. NW., Washington, D.C. 20036 offers two career pamphlets, one for undergraduates and one for faculty and graduate students, at $1 each. Also, *A Guide to Graduate Study in Political Science* is available for $7.50 for members and $10 for nonmembers. In addition, a monthly newsletter listing job openings, primarily academic, is available to members of the association.

Programs in Public Affairs and Administration, a directory that contains data on the academic content of programs, the student body, the format of instruction, and other information, may be purchased for $10 from:

National Association of Schools of Public Affairs and Administration, 1120 G St. NW., Suite 520, Washington, D.C. 20005.

Economists

(D.O.T. 050.067-010)

Nature of the Work

Economists study the way a society uses scarce resources such as land, labor, raw materials, and machinery to provide goods and services. They analyze the results of their research to determine the costs and benefits of making, distributing, and using resources in a particular way. Their research might focus on topics such as energy costs, inflation, business cycles, unemployment, tax policy, or farm prices.

Some economists who are primarily theoreticians may develop theories through the use of mathematical models to explain the causes of inflation. Most economists, however, are concerned with practical applications of economic policy in a particular area, such as finance, labor, agriculture, transportation, energy, or health. They use their understanding of economic relationships to advise business firms, insurance companies, banks, securities firms, industry associations, labor unions, government, and others.

Depending on the topic under study, economists may devise methods and procedures for obtaining data they need. For example, sampling techniques may be used to conduct a survey, and econometric modeling techniques may be used to develop projections. Preparing reports usually is an important part of the economist's job. He or she may be called upon to review and analyze all the relevant data, prepare tables and charts, and write up the results in clear, concise language.

Being able to present economic and statistical concepts in a meaningful way is particularly important for economists whose research is policy directed. Economists who work for business firms may be asked to provide management with information to make decisions on marketing and pricing of company products; to look at the advisability of adding new lines of merchandise, opening new branches, or diversifying the company's operations; to analyze the effect of changes in the tax laws; or to prepare economic and business forecasts. Business economists working for firms that carry on operations abroad may be asked to prepare forecasts of foreign economic conditions.

Economists who work for government agencies assess economic conditions in the United States and abroad and estimate the economic impact of specific changes in legislation or public policy. For example, they may study how changes in the minimum wage affect teenage unemployment. Most government economists are in the fields of agriculture, business, finance, labor, transportation, urban economics, or international trade. For example, economists in the U.S. Department of Commerce study domestic production, distribution, and consumption of commodities or services; those in the Federal Trade Commission prepare industry analyses to assist in enforcing Federal statutes designed to eliminate unfair, deceptive, or monopolistic practices in interstate commerce; and those in the Bureau of Labor Statistics analyze data on prices, wages, employment, and productivity.

Working Conditions

Economics faculty have flexible work schedules, dividing their time among teaching, research, and administrative responsibilities. Economists working for government agencies and private firms, on the other hand, have much more structured work schedules. They may work alone with only reports, statistical charts, computers, and calculators for company. Or they may be an integral part of a research team. Most work under pressure of deadlines, tight schedules, and heavy workloads, and sometimes must work overtime. Their routine may be interrupted by telephone calls, letters, special requests for data, meetings, or conferences. Travel may be necessary to collect data or attend conferences.

Economists review and analyze data in tables and charts.

Employment

Economists held about 30,000 jobs in 1982. About one-half of all economists were employed by government agencies, including a wide range of Federal agencies. Private industry, particularly manufacturing firms, banks, insurance companies, securities and investment companies, economic research firms, and management consulting firms, employed most of the rest. Some economists run their own consulting businesses. A number of economists combine a full-time job in government or business with part-time or consulting work in another setting.

Employment of economists is concentrated in large cities. The largest numbers are in New York City and Washington, D.C. Some work abroad for companies with major international operations; for the Department of State and other U.S. Government agencies; and for international organizations.

Besides the jobs described above, an estimated 15,000 persons held economics faculty positions in colleges and universities, according to data from the National Science Foundation. (For information about this occupation, see the statement on college and university faculty elsewhere in the *Handbook*.)

Training, Other Qualifications, and Advancement

Economists must thoroughly understand economic theory and mathematical methods of economic analysis. Since many beginning jobs in government and business involve the collection and compilation of data, a thorough knowledge of basic statistical procedures is required. In addition to courses in macroeconomics, microeconomics, econometrics, and business and economic statistics, training in computer science is highly recommended.

At the undergraduate level, courses in the following subjects also are valuable: Business cycles; economic and business history; economic development of selected areas; money

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and banking; international economics; public finance; industrial organization; labor economics; comparative economic systems; economics of national planning; urban economic problems and policies; marketing; consumer analysis; organizational behavior; and business law.

A bachelor's degree with a major in economics is sufficient for many beginning research, administrative, management trainee, and business sales jobs. However, graduate training increasingly is required for most economist jobs and for advancement to more responsible positions. Areas of specialization at the graduate level include advanced economic theory, comparative economic systems and planning, econometrics, economic development, economic history, environmental and natural resource economics, history of economic thought, industrial organization, institutional economics, international economics, labor economics, monetary economics, public finance, regional and urban economics, and social policy. Students should select graduate schools strong in specialties in which they are interested. Some schools help graduate students find internships or part-time employment in government agencies or economic research firms. Work experience and contacts can be useful in testing career preferences and learning about the job market for economists.

In the Federal Government, candidates for entrance positions generally need a college degree with a minimum of 21 semester hours of economics and 3 hours of statistics, accounting, or calculus. However, because competition is keen, additional education or experience may be required.

A master's degree generally is the minimum requirement for a job as a college instructor in many junior colleges and small 4-year schools. In some colleges and universities, however, a Ph.D. is necessary for appointment as an instructor. The Ph.D. is required for a professorship and for tenure, which is becoming increasingly difficult to obtain.

In government, industry, research organizations, and consulting firms, economists who have a graduate degree usually can qualify for more responsible research and administrative positions. A Ph.D. is necessary for top positions in many organizations. Experienced economists may advance to managerial or executive positions in banks, industrial concerns, trade associations, and other organizations to formulate business and administrative policy.

About 1,200 colleges and universities offer bachelor's degree programs in economics; about 200, master's; and about 130, doctoral programs.

Persons considering careers as economists should be able to work accurately with detail since much time is spent on data analysis. Patience and persistence are necessary because economists may spend long hours on independent study and problem solving. Sociability enables economists to work easily with others. Economists must be objective and systematic in their work and be able to express themselves effectively both orally and in writing. Creativity and intellectual curiosity are essential to success in this field, just as they are in other areas of scientific endeavor.

Job Outlook

Employment of economists is expected to grow about as fast as the average for all occupations through the mid-1990's. Most job openings will result from the need to replace experienced economists who transfer to other occupations, retire, or leave the labor force for other reasons.

Overall, economists are likely to have more favorable job prospects than most other social scientists. Opportunities should be best in business and industry, research organizations, and consulting firms, reflecting the complexity of the domestic and international economies and increased reliance on quantitative methods of analyzing business trends, forecasting sales, and planning purchasing and production. Employers will seek economists well trained in econometrics and statistics.

The continued need for economic analyses by lawyers, accountants, engineers, health service administrators, urban and regional planners, and others will also increase the number of jobs for economists. 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. Little or no change is expected in the employment of economists in State and local government. Since college enrollments are expected to decline through the mid-1990's, little or no employment growth is expected in colleges and universities. As a result, many highly qualified economics graduates will enter nonacademic positions.

Persons who graduate with a bachelor's degree in economics through the mid-1990's should face very keen competition for the limited number of economist positions for which they qualify. However, many will find employment in government, industry, and business as management or sales trainees, or as research or administrative assistants. Those with strong backgrounds in mathematics, statistics, and computer science may be hired by private firms for market research work. Candidates who hold master's degrees in economics face very strong competition, particularly for teaching positions in colleges and universities. However, some may gain positions in junior and community colleges. Those with a strong background in marketing and finance may have the best prospects in business and management consulting firms. Ph.D.'s are likely to face competition for academic positions, although top graduates from leading universities should have little difficulty in acquiring teaching jobs. However, a larger number of Ph.D.'s will be forced to accept jobs at smaller, less prestigious institutions. Ph.D.'s should have favorable opportunities to work as economists in government, industry, research organizations, and consulting firms.

Generally, a strong background in economic theory and econometrics provides the tools for acquiring any specialty within the field. Those skilled in quantitative techniques and their application to economic modeling and forecasting, including the use of computers, may have the best job opportunities.

Earnings

According to a 1982 salary survey by the College Placement Council, persons with a bachelor's degree in economics received an average starting salary of $18,500 a year. Median annual earnings of full-time economists were about $30,200 in 1982. The middle 50 percent earned between $19,200 and $36,400 annually. The lowest ten percent earned under $14,400 while the highest 10 percent earned over $46,800.

The median base salary of business economists in 1982 was $43,000, according to a survey by the National Association of Business Economists. About one-third of those responding also had income from secondary employment. Economists in general administration and international economics commanded the highest salaries; econometricians and teachers the lowest. The highest paid business economists were in the mining, nondurable manufacturing, and securities and investment industries; the lowest paid were in colleges and universities and in the construction industry.

The Federal Government recognizes education and experience in certifying applicants for entry level positions. In general, the entrance salary for economists having a bachelor's degree averaged about $13,000 a year in 1982; however, those with superior academic records could begin at about $16,100. Those having a master's degree could qualify for positions at an annual salary of about $19,700, while those with a Ph.D. could begin at about $23,800. Economists in the Federal Government averaged around $34,900 a year in 1982.

Related Occupations

Economists are concerned with understanding and interpreting financial matters, among other subjects. Others with jobs in this area include financial analysts, bank officers, accountants and auditors, underwriters, actuaries, securities sales workers, appraisers, credit analysts, loan officers, and budget officers.

Sources of Additional Information

For information on schools offering graduate training in economics, contact:

American Economic Association, 1313 21st Ave. South, Nashville, Tenn. 37212.

For additional information on careers in business economics, contact:

National Association of Business Economists, 28349 Chagrin Blvd., Suite 201, Cleveland, Ohio 44122.

Psychologists

(D.O.T. 045.061, .067, .107-022, -026, -030, and -034)

Nature of the Work

Psychologists study human behavior and mental processes to understand and explain people's

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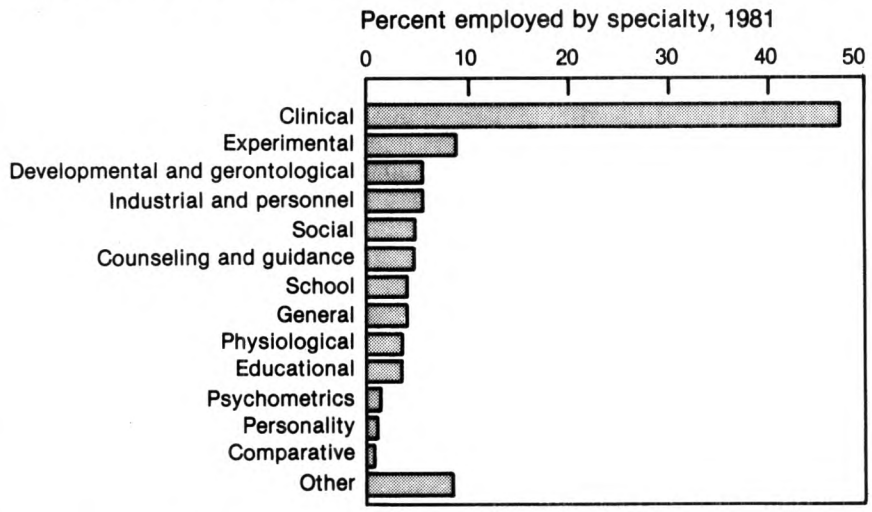
Nearly half of all doctoral psychologists are clinical specialists.



SOURCE: National Research Council

actions. Some research psychologists investigate the physical, emotional, or social aspects of human behavior. Other psychologists in applied fields counsel and conduct training programs; do market research; or provide health services in hospitals or clincs.

Like other social scientists, psychologists collect and test the validity of data and formulate hypotheses. Research methods depend on the topic under study. Psychologists may gather information through controlled laboratory experiments; performance, aptitude, and intelligence tests; observation, interviews, and questionnaires; clinical studies; or surveys.

Psychologists usually specialize. *Experimental psychologists* study behavior processes, and work with human beings and lower animals such as rats, monkeys, and pigeons; prominent areas of experimental research include motivation, learning and retention, sensory and perceptual processes, and genetic and neurological factors in behavior. *Developmental psychologists* study the patterns and causes of behavioral change as people progress through life; some concern themselves with behavior during infancy and childhood, while others study changes that take place during maturity and old age. *Personality psychologists* study human nature, individual differences, and the ways in which those differences develop. *Social psychologists* examine people's interactions with others and with the social environment; prominent areas of study include group behavior, leadership, attitudes, and interpersonal perception. *Comparative psychologists* study the behavior of different animals, including humans. *Physiological psychologists* study the relationship of behavior to the biological functions of the body. Psychologists in the field of *psychometrics* develop and apply procedures for measuring psychological variables such as intelligence and personality.

Clinical psychologists generally work in hospitals or clinics, or maintain their own practices. They help the mentally or emotionally disturbed adjust to life. They interview patients; give diagnostic tests; provide individual, family, and group psychotherapy; and design and carry through behavior modification programs. Clinical psychologists may collaborate with physicians and other specialists in developing treatment programs. Some clinical psychologists work in universities where they train graduate students in the delivery of mental health services. Others administer community mental health programs. *Counseling psychologists* use several techniques, including interviewing and testing, to advise people on how to deal with problems of everyday living—personal, social, educational, or vocational. *Educational psychologists* design, develop, and evaluate educational programs. *School psychologists* evaluate students' needs and problems, facilitate school adjustment, and help solve learning and social problems in schools. *Industrial and organizational psychologists* apply psychological techniques to personnel administration, management, and marketing problems. They are involved in policy planning, training and development, psychological test research, counseling, and organizational development and analysis, among other activities. For example, an industrial psychologist may work with management to develop better training programs and to reorganize the work setting to improve worker productivity. *Engineering psychologists*, often employed in factories and plants, develop and improve human/machine systems, military equipment, and industrial products. *Community psychologists* apply psychological knowledge to problems of urban and rural life. *Consumer psychologists* study the psychological factors that determine an individual's behavior as a consumer of goods and services. *Health psychologists* counsel the public in health maintenance to help people avoid serious emotional or physical illness. Other areas of specialization include environmental psychology, population psychology, psychology and the arts, history of psychology, psychopharmacology, and military and rehabilitation psychology.

Working Conditions

A psychologist's specialty and place of employment determine his or her working conditions. For example, clinical and counseling psychologists in private practice have pleasant, comfortable offices and set their own hours. However, they often have evening hours to accommodate their clients. Some employed in hospitals, nursing homes, and other health facilities often work evenings and weekends, while others in schools and clinics work regular hours. Psychologists employed by academic institutions divide their time among teaching, research, and administrative responsibilities. Some maintain part-time clinical practices as well. In contrast to the many psychologists who have flexible work schedules, some in government and private industry have more structured schedules. Reading and writing research reports, they often work alone behind a desk. Many experience the pressures of deadlines, tight schedules, heavy workloads, and overtime work. Their routine may be interrupted frequently. Travel may be required to attend conferences or conduct research.

Employment

Psychologists held about 83,000 jobs in 1982. Educational institutions—primarily colleges and universities—employed about 4 out of 10 psychologists in positions involving counseling, research, and administration. Hospitals, clinics, rehabilitation centers, nursing homes, and other health facilities employed about 3 out of 10 psychologists; government agencies at the Federal, State, and local levels, about 2 out of 10. The Veterans Administration, the Department of Defense, and the Public Health Service employ more psychologists than other Federal agencies. Psychologists also are employed by research organizations, management consulting firms, market research firms, and other businesses. After several years of experience, some enter private practice or set up their own research or consulting firms.

Besides the jobs described above, an estimated 24,000 persons held psychology faculty positions at colleges and universities, according to data from the National Science Foundation. For information about this occupation, see the statement on college and university faculty elsewhere in the *Handbook*.

Training, Other Qualifications, and Advancement

A doctoral degree is often required for employment as a psychologist, particularly in the academic world. Understandably, entrants to this occupation are older, on average, then entrants to other professional occupations. People with doctorates in psychology (Ph.D or Psy.D.—Doctor of Psychology) qualify for a wide range of responsible research, clinical, and counseling positions in universities, private industry, and government.

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People with a master's degree in psychology can administer and interpret tests as psychological assistants. Under the supervision of psychologists, they can conduct research in laboratories, counsel patients, or perform administrative duties. They may teach in 2-year colleges, or work as school psychologists or counselors. (See the *Handbook* statement on vocational and education counselors.)

People with a bachelor's degree in psychology are qualified to assist psychologists and other professionals in community mental health centers, vocational rehabilitation offices, and correctional programs; to work as research or administrative assistants; to take jobs as trainees in government or business; or—provided they meet State certification requirements—to teach high school. However, without additional academic training, their advancement opportunities are limited.

In the Federal Government, candidates having at least 24 semester hours in psychology and one course in statistics qualify for entry level positions. Competition for these jobs is keen, however. Clinical psychologists generally must have completed the Ph.D. or Psy.D. requirements and have served an internship; vocational and guidance counselors usually need 2 years of graduate study in counseling and 1 year of counseling experience.

At least 1 year of full-time graduate study is needed to earn a master's degree in psychology. Requirements usually include practical experience in an applied setting or a master's thesis based on a research project. Three to five years of graduate work usually are required for a doctoral degree. The Ph.D. degree culminates in a dissertation based on original research. The Psy.D., based on practical work and examinations rather than a dissertation, prepares students for clinical and other applied positions. In clinical or counseling psychology, the requirements for the doctoral degree generally include an additional year or more of internship or supervised experience.

Competition for admission into graduate programs is keen. Some universities require an undergraduate major in psychology. Others prefer only basic psychology with courses in the biological, physical, and social sciences, statistics, and mathematics.

Over 1,100 colleges and universities offer a bachelor's degree program in psychology; about 400, a master's; about 300, a Ph.D.; and about 10, a Psy.D. In addition, a growing number of professional schools of psychology not affiliated with colleges or universities offer the Psy.D. The American Psychological Association (APA) presently accredits Ph.D. training programs in clinical, counseling, and school psychology as well as Psy.D. programs. In 1983, 129 colleges and universities offered fully approved programs in clinical psychology (including 7 Psy.D. programs); 37 in counseling psychology; and 24 in school psychology (including 1 Psy.D. program). APA also has approved about 130 internship facilities for doctoral training in clinical and counseling psychology.

Although financial aid is becoming increasingly difficult to obtain, some universities award fellowships or scholarships, or arrange for part-time employment. The Veterans Administration (VA) offers predoctoral traineeships to interns in VA hospitals, clinics, and related training agencies. The National Science Foundation, the Department of Health and Human Services, the Armed Forces, and many other organizations also provide financial aid.

Psychologists who want to enter independent practice must meet certification or licensing requirements. In 1982, all States and the District of Columbia had such requirements. Licensing laws vary by State, but generally require a doctorate in psychology and 2 years of professional experience. In addition, most States require that applicants pass a written and an oral examination. Most State boards administer a standardized test. Some States certify those with master's level training as psychological assistants or associates. Some States require continuing education for relicensure.

Most States require that licensed or certified psychologists limit their practice to those areas in which they have developed professional competence through training and experience.

The American Board of Professional Psychology recognizes professional achievement by awarding diplomas in clinical, counseling, industrial and organizational, and school psychology. Candidates generally need a doctorate in psychology, 5 years of experience, and professional endorsements; they also must pass an examination.

People pursuing a career in psychology must be emotionally stable, mature, and able to deal effectively with people. Sensitivity, compassion, and the ability to lead and inspire others are particularly important for clinical work and counseling. Research psychologists should be able to do detailed work independently and as part of a team. Verbal and writing skills are necessary to communicate research findings. Patience and perseverance are vital qualities because results from psychological treatment of patients or research often are long in coming.

Job Outlook

Employment of psychologists is expected to increase faster than the average for all occupations through the mid-1990's. Largely because of the substantial investment in training required to enter this specialized field, psychologists have a strong attachment to their occupation—only a relatively small proportion leave the profession each year. Nevertheless, most job openings are expected to result from replacement needs.

Several factors may help maintain the demand for psychologists: Increased emphasis on health maintenance rather than treatment of illness; public concern for the development of human resources, which may result in more services for minorities, the elderly, and the poor; and increased testing and counseling of children. Government funding of these services could affect the demand for psychologists.

Some openings are likely to occur as psychologists increasingly study the effects on people

Sensitivity, compassion, and patience are essential qualities for counseling occupations.

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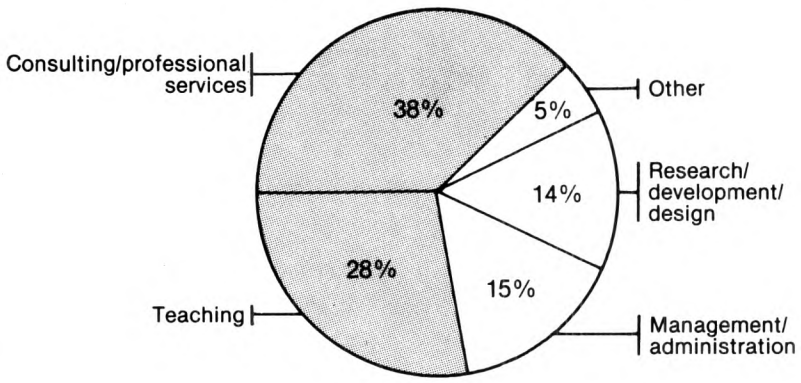
Most doctoral psychologists consult or teach.



SOURCE: National Research Council

of technological advances in areas such as agriculture, energy, the environment, and the conservation and use of natural resources. Psychologists also increasingly are involved in program evaluation in such fields as health, education, military service, law enforcement, and consumer protection.

Because college enrollments are expected to decline through the mid-1990's, little or no employment growth is expected in colleges and universities. As a result, there will be keen competition for academic positions. Although outstanding Ph.D. holders from leading universities should have no difficulty in obtaining teaching jobs at top schools, a larger number of Ph.D.'s will be forced to take jobs at smaller, less prestigious institutions. Some may accept part-time or temporary assignments with little or no hope of gaining tenure. As a result, many highly qualified graduates are expected to seek nonacademic jobs.

Persons holding doctorates from leading universities in applied areas such as clinical, counseling, health, and industrial or organizational psychology should have particularly good prospects. Psychologists with extensive training in quantitative research methods and computer science will have a competitive edge over applicants without this background.

Persons with only a master's degree in psychology will probably continue to encounter severe competition for the limited number of jobs for which they qualify. Nevertheless, some may find jobs as counselors in schools or as psychological assistants in community mental health centers. Bachelor's degree holders can expect very few opportunities in this field, although some may find jobs as assistants in rehabilitation centers.

Earnings

According to a 1981 survey by the National Research Council, the median annual salary of psychologists with a doctoral degree was about $30,900. In educational institutions, the median was about $29,000; in State and local government, about $27,900; in hospitals and clinics, about $30,100; in other nonprofit organizations, about $30,500; and in business and industry, about $40,300. Ph.D. or Psy.D. psychologists in private practice and in applied specialties generally have higher earnings than other psychologists.

The Federal Government recognizes education and experience in certifying applicants for entry level positions. In general, the average starting salary for psychologists having a bachelor's degree was about $13,000 or $16,100 a year in 1982; counseling psychologists with a master's degree and 1 year of counseling experience could start at $19,700; clinical psychologists having a Ph.D. or Psy.D. degree and 1 year of internship could start at $23,800. The average salary for psychologists in the Federal Government was about $34,900 a year in 1982.

Related Occupations

Psychologists are trained to evaluate, counsel, and advise individuals and groups. Others who do this kind of work are psychiatrists, social workers, clergy, special education teachers, and counselors.

Sources of Additional Information

For information on careers, educational requirements, and financial assistance, contact:

American Psychological Association, Educational Affairs Office, 1200 17th St. NW., Washington, D.C. 20036.

Information on traineeships and fellowships also is available from colleges and universities that have graduate departments of psychology.

Sociologists

(D.O.T. 054)

Nature of the Work

Sociologists study human society and social behavior by examining the groups that people form. These groups include families, tribes, communities, and governments, as well as a variety of social, religious, political, business, and other organizations. Sociologists study the behavior and interaction of groups, trace their origin and growth, and analyze the influence of group activities on individual members. Some sociologists are concerned primarily with the characteristics of social groups and institutions. Others are more interested in the ways individuals are affected by the groups to which they belong.

Fields of specialization for sociologists include social organization, social stratification and mobility, social psychology, evaluation research, urban sociology, racial and ethnic relations, political sociology, criminology and deviance, and industrial sociology. Other important specialties include medical sociology—the study of social factors that affect mental and public health; demography—the study of the size, characteristics, and movement of populations; gerontology—the study of the special problems faced by the growing number of aged persons in our rapidly changing society; social ecology—the study of the effect of the physical environment and technology on people; and clinical sociology—intervention in social systems for assessment and change.

Sociological research, like other kinds of social science research, involves collecting information, testing its validity, and analyzing the results. Sociologists usually conduct surveys or engage in direct observation to gather the data they need. For example, after providing for controlled conditions, a sociologist might test the effects of different styles of leadership on individuals in a small group. A medical sociologist might study the incidence of lung cancer in an area contaminated by industrial pollutants. Sociological researchers also conduct large-scale experiments to test the efficacy of different kinds of social programs. They might test and evaluate particular programs of income assistance, job training, or remedial education. Increasingly, sociologists apply statistical and computer techniques in their research. The results of sociological research aid educators, lawmakers, administrators, and others interested in social problems and social policy. Sociologists work closely with members of other professions including psychologists, physicians, economists, political scientists, anthropologists, and social workers.

Some sociologists are primarily administrators. They apply their professional knowledge in areas as diverse as intergroup relations, family counseling, public opinion analysis, law enforcement, education, personnel administration, public relations, regional and community planning, and health services planning. They may, for example, administer social service programs in family and child welfare agencies or develop social policies and programs for government, community, youth, or religious organizations.

A number of sociologists are employed as consultants. Using their expertise and research skills, they advise on such diverse problems as halfway houses and foster care for the mentally

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ill; ways of counseling ex-offenders; and market research for advertisers and manufacturers. Increasingly, sociologists are involved in the evaluation of social and welfare programs. Some do technical writing and editing.

Working Conditions

Most sociologists do a lot of desk work, reading and writing reports on their research. Sociology faculty have flexible work schedules, dividing their time between teaching, research, consulting, and administrative responsibilities. Sociologists working in government agencies and private firms have more structured work schedules, and many experience the pressures of deadlines, tight schedules, heavy workloads, and overtime. Their routine may be interrupted by numerous telephone calls, letters, requests for information, and meetings. Travel may be required to collect data for research projects or to attend professional conferences. Sociologists in private practice may work evenings and weekends to accommodate clients.

Employment

Sociologists held about 6,000 jobs in 1982. Government agencies employ about 1 out of 3 sociologists to deal with such subjects as poverty, crime, public assistance, population policy, social rehabilitation, community development, mental health, racial and ethnic relations, and environmental impact studies. Sociologists in the Federal Government work primarily for the Departments of Health and Human Services, Interior, Agriculture, and Defense. Some demographers work for international organizations such as the World Bank, the United Nations, and the World Health Organization. Some sociologists hold managerial, research, and planning positions in hospitals, corporations, research firms, professional and trade associations, consulting firms, and welfare or other nonprofit organizations. Some sociologists have private practices in counseling, research, or consulting.

Sociologists collaborate with others on research.

Besides the jobs described above, about 15,000 persons held sociology faculty positions in colleges and universities, according to data from the National Science Foundation. For more information about this occupation, see the statement on college and university faculty elsewhere in the *Handbook*.

Training, Other Qualifications, and Advancement

The Ph.D. degree is required for appointment to permanent teaching and research positions in colleges and universities and is essential for many senior level positions in research institutes, consulting firms, corporations, and government agencies. As the academic job market gets tighter through the mid-1990's, a Ph.D. will be required increasingly for virtually all professional sociologist positions.

Sociologists with master's degrees can qualify for administrative and research positions in public agencies and private businesses, provided they have sufficient training in research, statistical, and computer methods. However, advancement opportunities generally are more limited for master's degree holders than for Ph.D.'s. Sociologists with master's degrees may qualify for teaching positions in junior colleges and for some college instructorships.

Bachelor's degree holders in sociology may get jobs as interviewers or as administrative or research assistants. Many work as social workers, counselors, or recreation workers in public and private welfare agencies. Sociology majors who have sufficient training in statistical and survey methods may qualify for positions as junior analysts or statisticians in business or research firms or government agencies.

About 150 colleges and universities offer doctoral degree programs in sociology; most of these also offer a master's degree. In 170 schools, the master's is the highest degree offered, and about 900 schools have bachelor's degree programs. Sociology departments offer a wide variety of courses including sociological theory, social statistics and quantitative methods, crime and deviance, dynamics of social interaction, sex roles, population, social stratification, social control, small group analysis, urban sociology, social organizations, and sociology of religion, law, the arts, war, politics, education, work and occupations, and mental health.

Some departments of sociology have highly structured programs, while others are relatively unstructured and leave course selection largely up to the individual student. Departments have different requirements regarding foreign language skills, courses in statistics, internships, and completion of a thesis for the master's degree.

In the Federal Government, candidates generally need a college degree with 24 semester hours in sociology, including course work in theory and methods of social research. However, since competition for the limited number of positions is so keen, advanced study in the field is highly recommended.

The choice of a graduate school is important for people who want to become sociologists. Students should select schools that have adequate research facilities and offer appropriate areas of specialization such as theory, demography, clinical sociology, or quantitative methods. Opportunities to gain practical experience also may be available, and sociology departments frequently help place students in business firms and government agencies.

The ability to handle independent research is important for sociologists. Intellectual curiosity is an essential trait; researchers must have inquiring minds and a desire to find explanations for the phenomena they observe. Like other social scientists, sociologists must be objective in gathering information about social institutions and behavior; they need analytical skills in order to organize data effectively and reach valid conclusions; and they must be careful and systematic in their work. Because communicating their findings to other people is such an important part of the job, sociologists must be able to formulate the results of their work in a way that others will understand. The ability to speak well and to write clearly and concisely is a "must" in this field.

Job Outlook

Employment of sociologists is expected to increase about as fast as the average for all occupations through the mid-1990's. However, most openings are expected to result from the need to replace sociologists who transfer to other occupations, retire, or leave the labor force for other reasons. Increased demand for sociologists is likely to arise from the need to evaluate and administer programs designed to cope with social and welfare problems.

The number of persons who graduate with advanced degrees in sociology through the mid-1990's is likely to greatly exceed the available job openings. Graduates with a Ph.D. face increasing competition, particularly for academic positions, although those with degrees from the most outstanding institutions may have an advantage in securing teaching jobs.

An increasing proportion of Ph.D.'s are expected to enter nonacademic careers. Some may take research and administrative positions in government, research organizations, and business firms. Those well trained in quantitative research methods, including survey techniques, advanced statistics, and computer science, will have the widest choice of jobs. For example, private firms that contract with the government to evaluate social programs and conduct other research increasingly seek sociologists with strong quantitative skills. Demand is expected to be strong for those with training in applied areas such as clinical sociology, criminology, deviant behavior, medical sociology, social gerontology, and demography. For example, additional demographers may be sought to help businesses plan marketing and advertising programs and to help developing countries prepare population projections and formulate long-range public planning programs. Additional gerontologists may be needed to help formulate programs for our expanding elderly population. Sociologists with training in other applied disciplines, such as

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public policy, public administration, and business administration, will be attractive to employers seeking managerial and administrative personnel.

Persons with a master's degree will continue to face very strong competition for academic positions, although some may find jobs in junior and community colleges. They also will face strong competition for the limited number of nonacademic sociologist positions open to them. Some may find research and administrative jobs in research firms, business, and government. For example, sociologists with backgrounds in business and quantitative research methods may find opportunities in market research firms.

Bachelor's degree holders will find few opportunities for jobs as professional sociologists. As in the past, many graduates will take positions as trainees and assistants in business, industry, and government. As with advanced degree holders, training in quantitative research methods provides these graduates with the most marketable skills. Some may find positions in social welfare agencies. For those planning careers in law, journalism, business, social work, recreation, counseling, and other related disciplines, sociology provides an excellent background. Some who meet State certification requirements may enter high school teaching.

Earnings

According to a 1981 survey by the National Research Council, the median annual salary of all doctoral social scientists (including sociologists) was $30,900. For those in educational institutions, it was $29,800; in State and local government, $29,200; in nonprofit organizations, $30,400; and in business and industry, $38,900.

The Federal Government recognizes education and experience in certifying applicants for entry level positions. In general, the average entrance salary for sociologists with a bachelor's degree was about $13,000 or $16,100 a year in 1982, depending upon the applicant's academic record. The starting salary for those with a master's degree was about $19,700 a year, and for those with a Ph.D., about $23,800. Sociologists in the Federal Government averaged around $30,000 a year in 1982.

In general, sociologists with the Ph.D. degree earn substantially higher salaries than those without the doctoral degree. Some sociologists supplement their regular salaries with earnings from other sources, such as consulting or counseling work.

Related Occupations

Sociologists are not the only people whose jobs require an understanding of social processes and institutions. Others whose work demands such expertise include anthropologists, economists, geographers, historians, political scientists, psychologists, urban and regional planners, market research analysts, reporters and correspondents, and social workers.

Sources of Additional Information

Additional information on careers, and graduate departments of sociology is available from:

The American Sociological Association, 1722 N St. NW., Washington, D.C. 20036.

For information about careers in demography, contact:

Population Association of America, 806 15th St. NW., Suite 640, Washington, D.C. 20005.

For information on careers in clinical sociology, contact:

Clinical Sociology Association, c/o Jonathan Freedman, President, Hutchings Psychiatric Center, P.O. Box 27, Syracuse, N.Y. 13210.

Urban and Regional Planners

(D.O.T. 188.167-110 and 199.167-014)

Nature of the Work

Urban and regional planners, often called community or city planners, develop programs to provide for future growth and revitalization of urban, suburban, and rural communities. They help local officials make decisions on social, economic, and environmental problems.

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 or redevelopment and 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 systems and parking facilities.

Urban and regional planners prepare for situations that are likely to develop as a result of population growth or social and economic change. They 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 preparing plans for long-range community development, urban and regional planners prepare detailed studies that show the current use of land for residential, business, and community purposes. These reports include such information as the location of streets, highways, water and sewer lines, schools, libraries, and recreational sites. They also provide information on the types of industries in the community, characteristics of the population, and employment and economic trends. With this information, urban and regional planners propose ways of using undeveloped land and design the layout of recommended buildings and other facilities such as subway stations. They also prepare materials that show how their programs can be carried out and what they will cost.

Urban and regional planners often confer with land developers, civic leaders, and other public planning officials. They may prepare materials for community relations programs, speak at civic meetings, and appear before legislative committees to explain their proposals.

In large organizations, planners usually specialize in areas such as physical design, community relations, and the renovation or reconstruction of rundown business districts. In small organizations, planners must be able to do several kinds of work.

Working Conditions

Urban and regional planners spend most of their time in offices. To be familiar with areas that they are developing, however, they occasionally spend time outdoors examining the features of the land under consideration for development, its current use, and the types of structures existing on it. Although most planners have a scheduled 40-hour workweek, they sometimes must attend evening or weekend meetings or public hearings with citizens' groups.

Employment

Urban and regional planners held about 21,000 jobs in 1982. Local government planning agencies—city, county, or regional—employ about 7 out of 10. An increasing proportion of public agency plannners work in small jurisdictions with populations under 50,000. State and Federal agencies that deal with housing, transportation, or environmental protection employ most of the rest.

Many planners do consulting work, either part time in addition to a regular job, or full time for a firm that provides services to private developers or government agencies. Some planners work for large land developers or research organizations.

Urban and regional planners map current and proposed land uses.

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Training, Other Qualifications, and Advancement

Employers often seek workers who have advanced training in urban or regional planning. Most entry jobs in Federal, State, and local government agencies require 2 years of graduate study in urban or regional planning, or the equivalent in work experience. Although the master's degree in planning is the usual requirement at the entry level, some people who have a bachelor's degree in city planning, architecture, or engineering may qualify for beginning positions.

In 1982, about 80 colleges and universities offered a master's degree in urban or regional 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 planning require 2 or 3 years. Graduate students spend considerable time in workshops or laboratory courses learning to analyze and solve urban and regional planning problems and often are required to work in a planning office part time or during the summer.

Candidates for jobs in Federal, State, and local government agencies usually must pass civil service examinations to become eligible for appointment.

Planners must be able to think in terms of spatial relationships and visualize the effects of their plans and designs. They should be flexible and able to reconcile different viewpoints to make constructive policy recommendations.

After a few years' experience, urban and regional planners may advance to assignments requiring a high degree of independent judgment such as designing the physical layout of a large development or recommending policy, program, and budget options. Some are promoted to jobs as planning directors and spend a great deal of time meeting with officials in other organizations, speaking to civic groups, and supervising other professionals. Advancement beyond planning director is difficult and often occurs only through a transfer to a large city with more complex problems and greater responsibilities.

Job Outlook

Employment of urban and regional planners is expected to grow more slowly than the average for all occupations through the mid-1990's. Demand will be spurred by the importance of environmental, economic, and energy planning; interest in zoning and land-use planning in undeveloped and nonmetropolitan areas, including coastal areas; the need to replace old public facilities such as bridges, highways, and sewers; and expected population growth in suburban locations and in the South and West. However, slow growth in local government spending through the mid-1990's is expected to limit growth of urban planner jobs. Understandably, most jobs will arise from the need to replace experienced planners who transfer to other occupations, retire, or leave the labor force for other reasons.

In recent years, qualified applicants have exceeded openings in urban or regional planning, and the situation is expected to persist unless fewer degrees are awarded. As a result, some persons trained as planners may have to accept jobs in other areas of public policy and administration. An increasing proportion of urban planners are expected to find jobs in the private sector.

Graduates of prestigious academic institutions should have the best job prospects. Urban and regional planning graduates who have specialized in economic development, land-use planning, transportation systems, or health systems may be in particular demand. With increasing competition, geographic mobility and the willingness to work in small towns or rural areas are important for many jobseekers.

Earnings

According to a 1981 survey by the American Planning Association, urban and regional planners earned a median annual salary of about $26,000. The median annual salary of planners in city, county, and other local governments was $24,600; in State governments, $25,300; in private consulting firms, $30,000; in business, $33,000; and in nonprofit foundations, $24,000. For planners with over 10 years' experience, county and joint city/county agencies paid about $30,000 annually while private businesses and consulting firms paid about $40,000. Directors of public planning agencies earned from $1,300 to $2,100 more than staff members at comparable levels of experience.

Planners with a master's degree were hired by the Federal Government at a starting average salary of $19,700 a year in 1982. In some cases, persons having less than 2 years of graduate work could enter Federal service as interns at yearly salaries of about $13,000 or $16,100. Salaries of urban and regional planners employed by the Federal Government averaged $34,000 a year in 1982.

Related Occupations

Urban and regional planners develop plans for the orderly growth of urban and rural communities. Others whose work is related to the work of planners include architects, city managers, and planning engineers.

Sources of Additional Information

Additional information on careers and salaries in urban and regional planning, a list of schools offering training, and job referrals are available from:

American Planning Association, 1776 Massachusetts Ave. NW., Washington, D.C. 20036.

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Social and Recreation Workers

Those considering a career in social work or recreation should be "people-oriented," for helping people is what the work is all about. Social workers and recreation workers use a variety of techniques to help people cope with crises or live fuller lives.

Social workers assist individuals and families whose lives are being torn apart by poverty, alcoholism, drug abuse, behavior problems, or illness. They find families to adopt or provide foster care for children whose parents are unable to take care of them; see that needy families are able to give their children proper food, health care, and schooling; and step in when there is evidence of parental neglect or abuse. *School social workers* help students who have severe personal or family problems. *Group workers* give guidance and support so that young people will develop into responsible adults. Some social workers do corrections work, by counseling juvenile delinquents and serving as *probation officers* or *parole officers*. *Medical social workers* counsel hospital patients and advise the family—perhaps suggesting arrangements for home care after the patient leaves the hospital. *Psychiatric social workers*, usually employed in hospitals, clinics, or mental health centers, help patients respond to their treatment and serve as a link with the family and the community at large.

Growing attention is being given within the profession to directing and influencing social change. Social planners work with health, housing, transportation, and other planners to suggest ways of making communities more wholesome places in which to live. Social workers use various forms of direct action to help people deal with some of the basic forces that shape their lives. They may, for example, do research to identify community needs; draft legislation; or comment on government proposals in areas such as housing, health, and social and welfare services. Or they may help organizations in the community work for social betterment.

Recreation workers, too, help individuals and groups in a number of different ways. They develop and supervise activity programs for children, teenagers, and adults. Some specialize in therapeutic recreation, and plan and coordinate activities for people who are handicapped, emotionally disturbed, or chronically ill. Recreation workers often operate on a team basis with other professionals including therapists, nurses, physicians, social workers, counselors, and educators.

People enter professional positions in social work and recreation from a variety of backgrounds. To a certain extent, an applicant's formal education determines the amount of responsibility given and advancement opportunities. An MSW (master's in social work) is preferred or required for many social work positions, while a college degree with a major in recreation is increasingly important for those aspiring to a career in recreation or leisure services. In both fields, however, training is offered at the associate, bachelor's, master's, and Ph.D. levels. Ordinarily, a candidate with an associate degree would be offered a job as an activity leader or casework aide, while someone with a Ph.D. would be considered for a position in teaching, research, or administration. But the job market does not always operate as predictably as this; actual hiring decisions vary from time to time and place to place. Experience, or academic training in a related field, may be the decisive consideration.

New graduates are likely to experience competition for jobs through the mid-1990's. However, the job market will be more crowded in some fields of specialization and some parts of the country than in others. More detailed information about job outlook appears in the statements that follow.

Social Workers

(D.O.T. 195.107-010 through -046, .137-010, .164-010, .167-010, -014, -030, and -034, .267-014, and .367-018)

Nature of the Work

Social workers are community troubleshooters. Through direct counseling, referral to other services, or policymaking and advocacy, they help individuals, families, and groups cope with their problems. Those in the area of planning and policy help people understand how social systems operate and propose ways of bringing about needed change in institutions such as health services, housing, or education. Among the major helping professions, social work is distinguished by a tradition of concern for the poor and the disadvantaged.

The nature of the problem and the time and resources available determine which of several social work methods—casework, group work, or community organization—will be used. When necessary, the social worker refers clients to other professional or community resources. Using their training in human behavior, personality theory, and social group relations, for example, social workers might identify the need for assistance of children, teenagers, young adults, or older persons in places such as community centers, schools, hospitals, nursing homes, and correctional institutions. Social workers work in conjunction with or coordinate the efforts of civic, religious, business, and union organizations to combat social problems through community programs. For a neighborhood or larger area, they may help plan and develop health, housing, welfare, and recreation services. Social workers often coordinate existing services, organize fundraising for community social welfare activities, and aid in developing new community services.

Social workers who specialize in family services counsel individuals, work to strengthen personal and family relationships, and help clients cope with problems. They provide information and referral services in many areas—family budgeting and money management, locating housing, homemaker assistance for the elderly, job training, and day care for children of working parents.

Social workers who specialize in child welfare seek to improve the well-being of children and youth. They may advise parents on child care and child rearing, counsel children and youth with social adjustment difficulties, and arrange homemaker services during a parent's illness. Social workers may institute legal action to protect neglected or abused children, help unmarried parents, and counsel couples about adoption. After proper evaluation and home visits, they may place children for adoption, in foster homes, or institutions. If children have serious problems in school, child welfare workers may consult with parents, teachers, counselors, and others to identify the underlying problems.

Medical social workers and psychiatric social workers are trained to help patients and their families with problems that may accompany illness or inhibit recovery and rehabilitation. They work in hospitals, clinics, health maintenance organizations, nursing homes, rehabilitation centers, and offices of physicians. Hospital social workers may work with patients or with families of patients suffering from emotionally devastating illnesses. While discharge planning remains an important area of practice for hospital social workers, other roles are evolving. In some hospitals, social workers undertake primary care functions in departments of pediatrics or obstetrics. They are involved in health screening and health education, collaborate with community agencies to coordinate care, coordinate employee assistance programs, and serve as outpost workers to community agencies and groups of physicians.

Many social workers are in the mental health field. (See chart.) Much effort has gone into developing community based facilities to reduce the need for hospital care, and quite a few of these jobs are in community mental health centers, outpatient psychiatric clinics, or private practice settings. Still, there are a number of jobs for social workers who specialize in mental health in hospitals—in psychiatric hospitals in particular.

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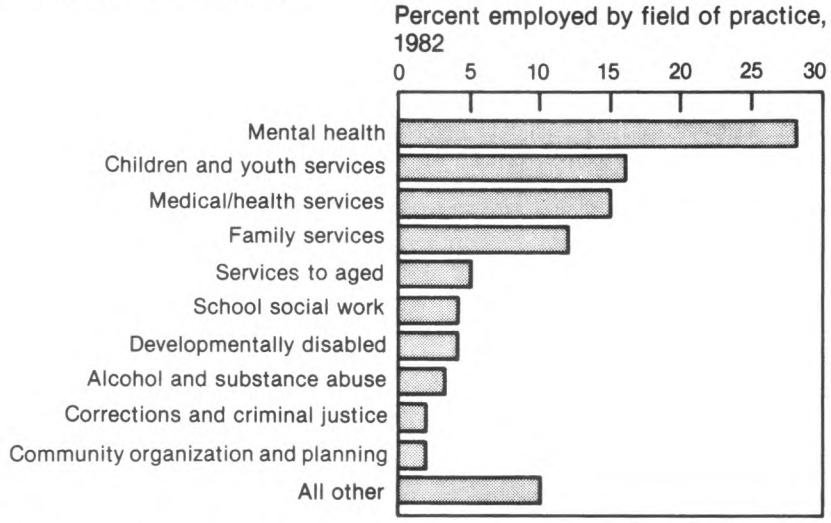
Mental health is an important social work specialty.



SOURCE: National Association of Social Workers

A growing number of social workers specialize in the field of aging. They plan and evaluate services for the elderly, and help older persons and their families deal with difficulties brought about by diminished capacities and changed circumstances. In nursing homes, for example, they help patients and their families adjust to the need for long-term institutional care.

Other social workers specialize in corrections. Correctional treatment specialists provide direct services for inmates of penal or correctional institutions, while probation and parole officers help offenders who are eligible for parole readjust to society. They counsel on the social problems that arise on returning to family and community life, and also may help secure necessary education, training, employment, or community services.

Working Conditions

Most social workers have a 5-day, 35- to 40-hour week. However, many, particularly in private agencies, work part time. Many work evenings and weekends to meet with clients, attend community meetings, and handle emergency situations. Compensatory time generally is granted for overtime. Because social workers often must visit clients or attend meetings, some travel may be necessary.

Employment

Social workers held 345,000 jobs in 1982. More than half of these jobs were in State, county, or municipal government agencies; relatively few were in the Federal Government. Social workers in the public sector are employed primarily in departments of human resources, social services, mental health, health, housing, education, and corrections. Those in the private sector work for voluntary nonprofit agencies; community and religious organizations; hospitals, nursing homes, and home health agencies; and other human service agencies.

Social workers practice in a variety of settings. Some are employed in business and industry, as "industrial" or "occupational" social workers. They generally are located in the personnel department or health unit, and support employee welfare through counseling, educational programs, and referral to community agencies. Industrial social workers might, for example, counsel employees about emotional problems, alcoholism, or drug abuse.

A small but growing number of social workers are in private practice. In 1982, more than 11 percent of the members of the National Association of Social Workers (NASW) engaged in private practice on either a part-time or full-time basis.

Although employment is concentrated in urban areas, many social workers work with rural families. 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.

Training, Other Qualifications, and Advancement

A bachelor's degree is the minimum requirement for most professional positions in this field. Besides the bachelor's in social work (BSW), undergraduate majors in psychology, sociology, and related fields satisfy hiring requirements in many social service agencies. A master's degree in social work (MSW) is generally required for positions in the mental health field and is almost always necessary for supervisory, administrative, or research positions. A doctorate in social work usually is required for teaching and is desirable for some research and administrative jobs.

In 1983, there were 335 accredited BSW programs and 88 MSW programs. BSW programs prepare graduates for direct service positions such as caseworker or group worker. Classroom instruction is offered in social work practice, social welfare policies, human behavior and the social environment, and social research methods. All accredited programs require supervised field experience.

An MSW degree is preferred for some entry level positions and is a decided asset for advancement to a supervisory position. In agencies facing a flood of job applicants, the MSW

A master's degree (MSW) is often required for a job in medical social work.

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may be essential. Two years of specialized study, including a period of supervised field instruction, or internship, are required to earn a master's degree in social work. Field placement affords an opportunity to test one's suitability for social work practice. At the same time, the student may develop expertise in a specialized area and make personal contacts that later are helpful in securing a permanent job. Previous training in social work is not required for entry into a graduate program, but courses such as psychology, sociology, economics, political science, history, social anthropology, and urban studies, as well as social work, are recommended. Some graduate schools offer accelerated MSW programs for qualified applicants.

A limited number of scholarships and fellowships are available for graduate education. A few social welfare agencies grant workers "educational leave" to obtain graduate education.

Career advancement usually takes the form of promotion to supervisor, administrator, or director, although some social workers go into advanced clinical or direct practice, teaching, research, or consulting. Like other administrators, directors of social service agencies hire, train, and supervise staff, develop and evaluate agency programs, make budget decisions, solicit funds, and represent the agency in public.

In addition to experience, which is essential, advancement in the social service field often requires an advanced degree. More than 40 schools of social work offer post-master's programs, most of which lead to a doctoral degree. Increasingly, social workers seeking to broaden their career options are pursuing graduate studies in related fields including human services administration, public administration, business administration, health services administration, education, and law. A number of graduate programs have developed joint degree programs in social work and another discipline.

In 1982, 28 States had licensing or registration laws regarding social work practice and the use of professional titles. Voluntary certification is offered by the National Association of Social Workers (NASW), which awards the title ACSW (Academy of Certified Social Workers) to those who qualify. For clinical social workers, professional credentials include listing in the *NASW Register of Clinical Social Workers* or in the *Registry of Health Care Providers in Clinical Social Work*.

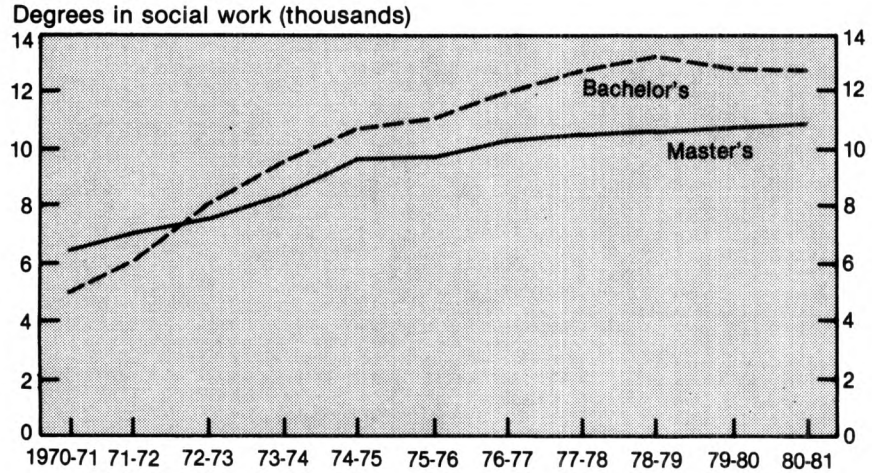
Social workers should be emotionally mature, objective, and sensitive, and should possess a basic concern for people and their problems. They must be able to handle responsibility, work independently, and maintain good working relationships with clients and coworkers. Volunteer, part-time, or summer work as a social work aide offer ways of testing one's interest in pursuing a career in this field.

Job Outlook

Employment of social workers is expected to increase about as fast as the average for all occupations through the mid-1990's, reflecting public and private response to the social service needs of a growing and aging population. The need to replace social workers who leave the occupation or stop working is expected to be the principal source of jobs, however.

Expansion of social services is likely to occur in hospitals, nursing homes, hospices, rehabilitation programs, and home health agencies; in community-based programs for the aging; and in the area of personal, family, and career counseling. Relatively high levels of unemployment coupled with problems caused by social change are expected to sustain a strong need for personnel in the social service field. Social workers will also be needed to work with professionals in other fields, including housing, transportation, criminal justice, and public administration.

Following a period of rapid growth, the number of degrees awarded in social work has leveled off.



SOURCE: National Center for Education Statistics

Opportunities for social workers in private practice will continue to depend on public acceptance of their role as independent practitioners; on the reimbursement issue (reimbursement for clinical social work services by health insurance or other third-party payers is not widespread); and on competition from other mental health providers—clinical psychologists, counselors, family therapists, and others.

Job prospects for social workers vary a great deal. Opportunities depend to some extent upon academic credentials—whether or not an applicant has formal social work training, and preferably an MSW—but geographic location is probably the most important consideration.

Competition is keen in cities where training programs for social workers abound. This competition is certain to intensify if social service programs are cut back in response to budget pressures on State and local governments. At the same time, population growth in the Sunbelt States is spurring expansion of social service programs there, and some isolated rural areas find it difficult to attract and retain qualified staff.

Trends in enrollment in social work education will affect future job prospects for social workers. Enrollments rose sharply in the early 1970's, nearly doubling between 1970 and 1975. (See chart.) The number of social work degrees awarded each year has begun to stablize since the mid-1970's, but a number of factors point to a decline during the 1980's and 1990's. Most important is the impending decrease in the college-age population, projected to decline by more than 20 percent between 1982 and 1995.

If fewer people prepare for social work careers while demand continues to grow, conditions in the now-crowded job market are likely to improve. Job search problems of MSW's should abate and prospects for BSW's probably will improve. Very strong competition will continue, however, for the substantial number of associate and bachelor's degree holders seeking entry level human service jobs that do not require formal preparation in social work.

Earnings

Salaries for social workers at all levels vary greatly by type of agency (private or public; Federal, State, or local) and geographic region, but generally are highest in large cities and in States with sizable urban populations. Private practitioners, administrators, teachers, and researchers often earn considerably more than other types of social workers.

Average starting salaries for social caseworkers (positions requiring a BSW) in State and local governments averaged about $14,300 in 1982, according to a survey conducted by the International Personnel Management Association; for social service supervisors, the average starting salary was $18,100.

The average annual starting salary for social workers (positions requiring an MSW and 1 year of related experience) in hospitals and medical centers was about $18,100 in 1982,

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according to a survey conducted by the University of Texas Medical Branch. Top salaries for experienced social workers in these settings averaged $23,800.

In the Federal Government, social workers with an MSW started at $20,256 in 1982; average earnings for social workers in the Federal service were $28,300. Graduates with a Ph.D. or job experience may start at a higher salary. Most social workers in the Federal Government are employed by the Veterans Administration and the Departments of Health and Human Services, Education, Justice, and Interior.

Related Occupations

Through direct counseling or referral to other services, social workers help people solve a range of personal problems. Workers in occupations with similar duties include: The clergy, counselors, counseling psychologists, and vocational rehabilitation counselors.

Sources of Additional Information

For information about career opportunities in social work, contact:

National Association of Social Workers, 7981 Eastern Ave., Silver Spring, Md. 20910.

The Council on Social Work Education publishes an annual *Directory of Accredited BSW Programs* and *Directory of Accredited MSW Programs*, which may be purchased for $2.00 each, postpaid. These and other publications are available from:

Council on Social Work Education, 1744 R St. NW., Washington, D.C. 20036.

Recreation Workers

(D.O.T. 159.124-010; 187.137-010; 195.167-018, .227-010 and -014, .367-030; and 352.167-010)

Nature of the Work

As leisure time in our lives increases, opportunities for organized recreation become more important. Recreation workers plan, organize, and direct activities that help people enjoy and benefit from leisure hours. These workers hold a wide range of jobs, which bring them in contact with people of all ages, socioeconomic levels, and degrees of emotional and physical health.

Recreation programs, whether institutionally or community based, are as diverse as the people they serve. Employment settings range from pristine wilderness areas to health clubs in suburban shopping malls. At local playgrounds and community centers, for example, recreation personnel organize and conduct a variety of leisure activities, including arts, crafts, fitness, and sports. Other employment settings include parks, camps, campgrounds, and recreational areas; schools, churches, and synagogues; retirement communities, nursing homes, senior centers, and adult day care programs; and correctional institutions.

Under a camp director, counselors lead and instruct campers in nature-oriented forms of recreation such as swimming, hiking, and horseback riding as well as outdoor education. They also provide campers with specialized instruction in a particular area such as music, drama, gymnastics, tennis, or computers. In resident camps, the staff must insure that the campers have adequate living conditions.

Recreation personnel in industry organize and direct leisure activities and athletic programs such as bowling and softball leagues, social functions, and exercise and fitness programs.

Therapeutic recreation (also known as recreation therapy) is a small but growing specialty designed to help individuals recover or adjust to illness, disability, or specific social problems. A clinical specialty within recreation, therapeutic recreation is a form of individualized medical treatment, similar to physical therapy or occupational therapy. It is carried out in hospitals and nursing homes, for the most part, under the supervision of a physician.

Recreation workers occupy a variety of positions at different levels of responsibility. *Recreation leaders* provide face-to-face leadership and are responsible for a recreation program's daily operation. They may give instruction in crafts, games, and sports, keep records, and maintain recreation facilities. Recreation leaders who give instruction in specialties such as art, music, drama, swimming, or tennis are called *activity specialists*. They often conduct classes and coach teams in the activity in which they specialize. A camp counselor, who is generally a recreation leader, may also be an activity specialist. Recreation leaders usually work under a supervisor.

Recreation supervisors plan programs to meet the needs of the population they serve; supervise recreation leaders, sometimes over an entire region; and direct specialized activities.

Recreation administrators or *directors* manage recreation programs. They have overall responsibility for program planning, budget, and personnel.

Working Conditions

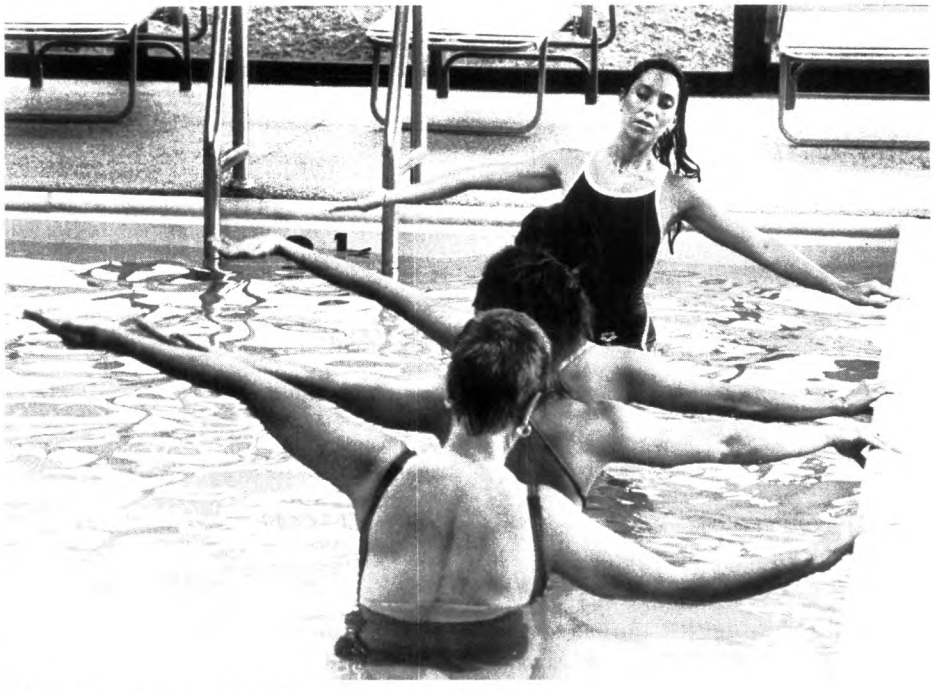
While the average week for recreation workers is 35-40 hours, people entering this field should expect some night work and irregular hours. Workers often spend much time outdoors.

Because recreation workers are employed wherever there are people who have leisure time, the distribution of employment follows overall population patterns; most jobs are in the urban and suburban areas where the majority of Americans live. However, jobs in camping are found mostly in the less populated areas of the country because of the outdoor nature and orientation of camping programs. Some camp workers receive room and board as part of their compensation.

Employment

Recreation workers held about 124,000 jobs in 1982. (This estimate does not include many summer workers.) About 40 percent of the jobs were in Federal, State, or local government agencies, primarily in park and recreation departments at the municipal and county levels, and in State park systems. The Federal Government employs recreation specialists, sports specialists, outdoor recreation planners, and recreation assistants and aides for programs run by the Veterans Administration and the Departments of Defense and Interior.

Nearly 25 percent of the jobs were in membership organizations with a civic, social, fraternal, or religious orientation—the Boy Scouts, Girl Scouts, and Red Cross, for example. Not quite 15 percent were in programs run by social service organizations (senior centers and adult day care programs, for example) or in



Teaching swimming is part of this recreation worker's job.

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residential care facilities such as halfway houses, group homes, and institutions for delinquent youth.

About 10 percent of the jobs were in hospitals, nursing homes, and other health care facilities, and most of the remainder were in private and commercial recreation—including amusement parks, sports and entertainment centers, wilderness and survival enterprises, tourist attractions, vacation excursions, hotels and other resorts, camps, health spas, athletic clubs, apartment complexes, and other settings.

The recreation field is characterized by an unusually large number of part-time, seasonal, and volunteer jobs. Some volunteers serve on local park and recreation boards and commissions. The vast majority, however, serve as volunteer activity leaders at local playgrounds, or in youth organizations, camps, nursing homes, hospitals, senior centers, and other settings. Volunteer experience and part-time work during school may lead to a full-time job. The largest number of paid employees in the recreation field are part-time or seasonal workers. Typical jobs include summer camp counselors and playground leaders, lifeguards, craft specialists, and after-school and weekend recreation program leaders. Many jobs are filled by teachers and college students.

Training, Other Qualifications, and Advancement

Educational requirements for jobs in this field vary a great deal. Many applicants for full-time career positions are college graduates with majors in recreation, leisure studies, or physical education, but a bachelor's degree in any liberal arts field may be appropriate. Some jobs require specialized training in a particular field, such as art, music, drama, or athletics.

A college degree is not always necessary. Some recreation positions are filled by high school graduates, while others are filled by graduates of associate degree programs in parks and recreation, social work, and other human service technologies. A number of jobs in this field are held by college students who work part-time while earning a degree.

Most supervisors have a bachelor's degree plus experience. Persons with academic preparation in parks and recreation management, leisure studies, physical education, fitness management, and related fields generally have better prospects for career advancement, although this varies from one employer to another.

A bachelor's degree and experience are considered minimum requirements for administrators. However, increasing numbers are obtaining master's degrees in parks and recreation as well as in related disciplines. Many persons in other disciplines, including social work, forestry, and resource management, pursue graduate degrees in recreation.

In industrial recreation, companies seeking recreation directors prefer applicants with a bachelor's degree in recreation and a strong background in business administration. While a bachelor's degree in recreation or education is generally the minimum requirement camp director, a master's degree is often preferred.

In 1982, about 200 community and junior colleges offered associate degree park and recreation programs, and 300 colleges and universities offered programs leading to a bachelor's, master's, or Ph.D. degree. Approximately 150 schools offered programs in therapeutic recreation; while some of these lead to an associate degree, most are at the bachelors or masters levels.

The National Recreation and Park Association (NRPA) accredits 34 park and recreation curriculums at the bachelor's degree level. Accredited programs provide broad exposure to the history, theory, and philosophy of park and recreation management. Courses are offered in community organization; supervision and administration; recreational needs of special populations such as the elderly or handicapped; and supervised fieldwork. Students have an opportunity to specialize in areas such as therapeutic recreation, park management, outdoor recreation, industrial or commercial recreation, and camp management.

The American Camping Association has developed a curriculum for camp director education in colleges and universities. Many national youth associations offer training courses for camp directors at the local and regional levels.

Persons planning recreation careers must be good at motivating people and sensitive to their needs. Good health and physical stamina are required. Activity planning calls for creativity and resourcefulness. Willingness to accept responsibility and the ability to exercise judgment are important qualities since recreation personnel often work alone. To increase their leadership skills and understanding of people, students are advised to obtain related work experience in high school and college. Such experience may help students decide whether their interests really point to a human service career. Students also should talk to local park and recreation professionals, school guidance counselors, and others.

Professional credentials for this field are offered by the National Recreation and Park Association (NRPA), the American Camping Association, the American Health Care Association, and the National Council for Therapeutic Recreation Certification. Over 30 States have adopted NRPA standards for park/recreation technicians and park/recreation professionals. The American Camping Association certifies individuals who meet their standards of professional competence. The American Health Care Association maintains a registry of activity coordinators who meet its standards. Finally, the National Council for Therapeutic Recreation Certification awards certification to recreation therapist who meet its standards.

Neither registration nor certification is usually required for employment or advancement in this field, although there are exceptions. In the case of therapeutic recreation, for example, hiring in long-term care facilities that accept Medicare and Medicaid patients is subject to Federal standards governing the qualifications of members of the facility's activity staff. Therapeutic recreation specialists certified by the National Council for Therapeutic Recreation Certification or registered with the American Health Care Association satisfy the Federal requirement for the position of activity coordinator. Local job market conditions play a role, too. Employers faced with an abundance of qualified applicants are likely to give preference to those with professional credentials in therapeutic recreation. Two States—Utah and Georgia—license therapeutic recreation workers.

Job Outlook

Employment of recreation workers is expected to grow about as fast as the average for all occupations through the mid-1990's as people have more leisure time; as more older people use senior centers and nursing homes; and as additional recreation sites are constructed. Most job openings, however, will result from replacement needs.

The outlook for recreation workers depends to a large extent on local government funding. Budget constraints are likely to continue, although priorities as well as resources for public services vary from one community to another. Park and recreation programs often are among the first to be cut when budget problems arise. Camping, however, is supported primarily by the private sector—profit-making firms as well as voluntary agencies run camps—and therefore is not as vulnerable to budget cuts as publicly funded recreation programs.

Because the field is open to all college graduates regardless of major, the number of applicants for full-time positions in recreation greatly exceeds the number of job openings. Keen competition for jobs is expected to continue. Individuals with recreation experience, and those with formal training in related fields, are expected to have the best opportunities for staff positions. Those with graduate degrees should have the best opportunities for supervisory or administrative positions.

Commercial recreation is expected to offer more favorable opportunities than either the public or voluntary sectors. Hiring practices in commercial recreation vary a great deal, however, and employers' preference for applicants with formal training in recreation, physical education, and related fields has not been clearly established.

Opportunities for therapeutic recreation workers are likely to be good through the mid-1990's, in line with the anticipated demand for additional rehabilitation services for a growing and aging population. The expanding supply of people with the requisite credentials may lead to competition, however. (People with formal training in special education and occupational therapy may qualify for jobs as therapeutic recreation workers.) Therapeutic recreation workers have been successful in finding jobs working with the disabled elderly in both institutional and community-based settings.

The overall market for recreation and activity jobs in the field of aging is likely to remain competitive, however. This reflects differences in the supply of qualified applicants. While employers tend to seek individuals with formal

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training in therapy when staffing programs for severely disabled older persons, they apparently feel that people from a variety of backgrounds can function effectively with the "well elderly." This greatly increases the amount of competition for jobs in senior centers, retirement communities and local parks and recreation department programs for the elderly. Activities programs in nursing homes, too, attract an abundance of jobseekers.

Earnings

According to a 1982 survey by the International Personnel Management Association, States paid recreation program leaders with a bachelor's degree an average beginning salary of about $13,000; experienced workers, about $18,100. Municipalities paid program leaders an average beginning salary of about $13,700; experienced workers, about $17,200.

According to the American Camping Association, the average salary for camp directors was about $1600 a month in public camps in 1982. Salaries for camp directors in private camps were somewhat higher.

The average annual starting salary for recreation therapists in hospitals and medical centers was about $15,700 in 1982, according to a survey conducted by the University of Texas Medical Branch. Top salaries for experienced recreation therapists in these settings averaged $19,600, and some were as high as $29,800.

Most public and private recreation agencies provide vacation and other fringe benefits such as sick leave and hospital insurance.

Related Occupations

Recreation workers must exhibit leadership and sensitivity in dealing with people. Other occupations that require similar personal qualities include social workers, parole officers, human relations counselors, school counselors, clinical and counseling psychologists, and teachers.

Sources of Additional Information

Information about careers in recreation or in recreation therapy is available from:

National Recreation and Park Association, Division of Professional Services, 3101 Park Center Dr., Alexandria, Va. 22302.

The 1981 edition of NRPA's *Directory of College/University Programs in Recreation, Leisure Services and Resources* may be purchased for $5.00 plus postage and handling. Career information is also available from:

American Association for Leisure and Recreation, 1900 Association Dr., Reston, Va. 22091.

The 1983 edition of AALR's *Directory of Professional Preparation in Parks and Recreation* may be purchased for $8.50 plus postage and handling.

For information on careers in industrial recreation, contact:

National Employee Services and Recreation Association, 2400 South Downing St., Westchester, Ill. 60153.

For information on careers in camping and job referrals, send request and postpaid return envelope to:

American Camping Association, Bradford Woods, Martinsville, Ind. 46151.

For information about a career as an activity coordinator in a nursing home, or for information about registration by the AHCA Section of Activity Coordinators, contact:

American Health Care Association, 1200 15th St. NW., Washington, D.C. 20005.

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Religious Workers

Most religious workers are members of the clergy. A career in the clergy requires different considerations from those in other career fields. Persons entering the ministry, priesthood, or rabbinate should do so primarily because they possess a strong religious faith and a desire to help others. Nevertheless, knowledge about the profession, how to prepare for it, and the kind of life it offers are important.

The number of clergy needed depends largely on the number of people who participate in organized religious groups. This affects the number of churches and synagogues established and 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; some serve as missionaries or work in social welfare agencies.

Persons considering a career in the clergy should seek the counsel of a religious leader of their faith to aid in evaluating their qualifications. Most important are a deep religious belief and a desire to serve the spiritual needs of others. Priests, ministers, and rabbis also are expected to be models of moral and ethical conduct. A person considering one of these fields must realize that the civic, social, and recreational activities of a member of the clergy often are influenced and restricted by the customs and attitudes of the community.

The clergy should be sensitive to the needs of others and able to help people deal with these needs. The job demands an ability to speak and write effectively, to organize, and to supervise others. The person entering this field also must enjoy studying, because the occupation requires continuous learning and demands considerable initiative and self-discipline.

In addition to the clergy, some lay people are religious workers. Many coordinate the activities of various denominational groups to meet the religious needs of students or direct religious school programs designed to promote religious education among members of their faith. Like members of the clergy, they sometimes provide counseling and guidance on marital, health, financial, and religious problems. Lay people are expected to play an increasingly important role in nonliturgical functions.

Education and training requirements as well as job prospects for the clergy vary widely among faiths and even among branches within some faiths. A detailed discussion of training requirements, job prospects, and other information on the clergy in the three largest faiths in the United States—Protestant, Roman Catholic, and Jewish—is presented in the following statements. Information on the clergy in other faiths and on lay religious workers may be obtained directly from leaders of the respective groups.

Protestant Ministers

(D.O.T. 120.007-010)

Nature of the Work

Protestant ministers lead their congregations in worship services and administer the various rites of the church, such as baptism, confirmation, and Holy Communion. They prepare and deliver sermons and give religious instruction. 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 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 personally with parishioners. Those serving large congregations have greater administrative responsibilities and spend considerable time working with committees, church officers, and staff, besides other duties. They may share specific aspects of the ministry with one or more associates or assistants, such as a minister of education who assists in educational programs for different age groups, or a minister of music.

Working Conditions

Ministers are "on call" for any serious troubles or emergencies that involve or affect members of their churches. They also may work long and irregular hours in administrative, educational, and community service activities.

Many of the ministers' duties are sedentary, such as reading or doing research in a study or a library to prepare sermons or write articles.

In some denominations, ministers are reassigned by a central body to a new pastorate every few years.

Employment

In 1982, an estimated 243,000 Protestant ministers served individual congregations. Some also worked in closely related fields such as chaplains in hospitals and the Armed Forces.

A minister explains biblical passages to a class in religious studies.

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Most ministers are employed by the five largest Protestant churches—Baptist, Methodist, Lutheran, Presbyterian, and Pentecostal.

All cities and most towns in the United States have at least one Protestant church with a full-time minister. Some churches employ part-time ministers who are seminary students, retired ministers, or holders of secular jobs. Although most ministers are located in urban areas, many serve two or more congregations in less densely populated areas.

Training and Other Qualifications

Educational requirements for entry into the Protestant ministry vary greatly. Some denominations have no formal educational requirements, and others ordain persons having various types of training in Bible colleges, Bible institutes, or liberal arts colleges.

In 1982, about 140 American Protestant theological institutes were accredited by the Association of Theological Schools in the United States and Canada. These admit only students who have received a bachelor's degree or its equivalent with a liberal arts major from an accredited college. Many denominations require a 3-year course of professional study in one of these accredited schools or seminaries after college graduation for the degree of master of divinity.

Recommended preseminary or undergraduate college courses include English, history, philosophy, natural sciences, social sciences, fine arts, music, religion, and foreign languages. These courses provide a knowledge of modern social, cultural, and scientific institutions and problems. However, students considering theological study should contact, at the earliest possible date, their denominations and the schools to which they intend to apply, to learn how to prepare for the program they hope to enter.

The standard curriculum for accredited theological schools consists of four major categories: Biblical, historical, theological, and practical. Courses of a practical nature include pastoral care, preaching, religious education, and administration. Many accredited schools require that students work under the supervision of a faculty member or experienced minister. Some institutions offer doctor of ministry degrees to students who have completed additional study, usually two or more years, and served at least two years as a minister. Scholarships and loans are available for students of theological institutions.

In general, each large denomination 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 after graduation from a seminary or after serving a probationary pastoral period. Denominations that do not require seminary training ordain clergy at various appointed times. For example, the Evangelical minister may be ordained with only a high school education.

Men and women entering the clergy often begin their careers as pastors of small congregations or as assistant pastors in large churches.

Job Outlook

The anticipated slow growth in church membership combined with pressures of rising costs and inadequate financial support are expected to result in only limited growth in the need for ministers through the mid-1990's. The number of persons being ordained has been increasing, and this trend is likely to continue. As a result, new graduates of theological schools are expected to face increasing competition in finding positions and more experienced ministers will face competition in moving to large congregations with greater responsibility. The supply-demand situation will vary among denominations, with more favorable prospects for ministers in Evangelical churches. Ministers willing to work in rural areas also should have relatively favorable opportunities. Most of the openings for ministers through the mid-1990's will arise from the need to replace those who retire, die, or leave the ministry for other reasons.

Employment alternatives for newly ordained Protestant ministers who are unable to find positions in parishes include working in youth counseling, family relations, and welfare organizations; teaching in religious educational institutions; and serving as chaplains in the Armed Forces, hospitals, universities, and correctional institutions.

Earnings

Salaries of Protestant clergy vary substantially, depending on age, experience, denomination, size and wealth of congregation, and geographic location. Based on limited information, the estimated average annual income of Protestant ministers was about $16,500 in 1982. Fringe benefits, such as housing and transportation, may add as much as 25 percent to a minister's annual salary.

Related Occupations

Protestant ministers advise and counsel individuals and groups regarding their religious as well as personal, social, and vocational development. Other occupations involved in this type of work include social workers, clinical and counseling psychologists, teachers, and counselors.

Sources of Additional Information

Persons who are interested in entering the Protestant ministry should seek the counsel of a minister or church guidance worker. Each theological school can supply information on admission requirements. Prospective ministers also should contact the ordination supervision body of their particular denomination for information on special requirements for ordination.

Occupational information about the Protestant ministry can also be obtained from: National Council of Churches, Professional Church Leadership, 475 Riverside Dr., New York, N.Y. 10027.

Rabbis

(D.O.T. 120.007-010)

Nature of the Work

Rabbis are the spiritual leaders of their congregations, and teachers and interpreters of Jewish law and tradition. They conduct religious services and deliver sermons on the Sabbath and on Jewish holidays. Like other clergy, 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, Reform, or Reconstructionist congregations. Regardless of their particular point of view, all Jewish congregations preserve the substance of Jewish religious worship. 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.

Working Conditions

Rabbis work long hours and are "on call" to visit the sick, comfort the bereaved, and counsel those who need it. Community and educational activities may also require long or irregular hours.

Some of their duties are intellectual and sedentary, such as studying religious texts and researching and writing sermons and articles for publication.

Rabbis have a good deal of independent authority, since they have no formal hierarchy. They are responsible only to the Board of Trustees of the congregations they serve.

Employment

In 1982, there were an estimated 6,500 practicing rabbis. Of these, approximately 1,500 Orthodox, 800 Conservative, 700 Reform, and 60 Reconstructionist rabbis had synagogues. Most of the rest taught in Jewish Studies programs at colleges and universities. Others worked as chaplains in the military services, in hospitals and other institutions, or in one of the many Jewish community service agencies.

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Counseling is an integral part of a rabbi's duties.

Although rabbis serve Jewish communities throughout the Nation, they are concentrated in major metropolitan areas that have large Jewish populations.

Training and Other Qualifications

To become eligible for ordination as a rabbi, a student must complete a course of study in a seminary. Entrance requirements and the curriculum depend upon the branch of Judaism with which the seminary is associated.

About 30 seminaries train Orthodox rabbis. The Rabbi Issac Elchanan Theological Seminary and the Beth Medrash Govoha Seminary are representative of Orthodox seminaries. The former requires a bachelor's degree for entry and has a formal 3-year ordination program. The latter has no formal admission requirements but may require more years of study for ordination. The training is rigorous. When students have become sufficiently learned in the Talmud, the Bible, and other religious studies, they may be ordained with the approval of an authorized rabbi, acting either independently or as a representative of a rabbinical seminary.

The Jewish Theological Seminary of America trains rabbis for the Conservative branch. The Hebrew Union College—Jewish Institute of Religion trains rabbis for the Reform branch. Both seminaries require the completion of a 4-year college course, as well as earlier preparation in Jewish studies, for admission to the rabbinical program leading to ordination. A student with a strong background in Jewish studies can complete the course at the Conservative seminary in 4 years; for other enrollees, the course may take as long as 6 years. Normally 5 years of study are required to complete the rabbinical course at the Reform seminary, including 1 year of preparatory study in Jerusalem. Exceptionally well-prepared students can shorten this 5-year period to a minimum of 3 years.

The Reconstructionist Rabbinical College trains rabbis in the newest branch of Judaism. A bachelor's degree is required for admission. The rabbinical program is based on a 5-year course of study which emphasizes, in each year, a period in the history of Jewish civilization. In addition, students are required to earn a master's degree in a related field at an area university. Graduates are awarded the title "Rabbi" and, with special study, can earn the Doctor of Hebrew Letters degree.

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. Students of the Reform seminary get extensive practical training in dealing with social and political problems in the community. Training for alternatives to the pulpit, such as leadership in community services and religious education, increasingly is stressed.

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 on college campuses, teachers in seminaries and other educational institutions, or chaplains in the Armed Forces. As a rule, experienced rabbis fill the pulpits of large and well-established Jewish congregations.

Job Outlook

The job outlook for rabbis varies among the four major branches of Judaism.

Orthodox clergy currently face keen competition because the number of graduates from Orthodox seminaries is increasing at a more rapid pace than the number of pulpits.

Rabbis in the Conservative and Reform branches are expected to have good employment opportunities if present trends continue. Their seminaries balance supply and demand by limiting enrollments.

Reconstructionist rabbis also are expected to have good employment opportunities. Membership is expanding rapidly and demand is expected to exceed supply.

Newly ordained rabbis who do not have a pulpit may work for a Jewish social service agency, teach in a religious educational institution, or serve as chaplain in the Armed Forces or in hospitals, universities, or correctional institutions.

Earnings

Income varies, depending on the size and financial status of the congregation, as well as its denominational branch and geographic location. Rabbis usually earn additional income from gifts or fees for officiating at ceremonies such as weddings.

Based on limited information, annual earnings of rabbis generally ranged from $20,000 to $50,000 in 1982, including fringe benefits.

Related Occupations

Rabbis advise and counsel individuals and groups regarding their religious as well as personal, social, and vocational development. Other occupations involved in this type of work include social workers, clinical and counseling psychologists, teachers, and counselors.

Sources of Additional Information

Persons who are interested in becoming rabbis should discuss their plans for a vocation with a practicing rabbi. Information on the work of rabbis and allied occupations can be obtained from:

The Rabbi Isaac Elchanan Theological Seminary, 2540 Amsterdam Ave., New York, N.Y. 10033. (Orthodox)

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Beth Medrash Govoha Seminary, 626 Seventh St., Lakewood, N.J. 08701. (Orthodox)

The Jewish Theological Seminary of America, 3080 Broadway, New York, N.Y. 10027. (Conservative)

Hebrew Union College—Jewish Institute of Religion, Director of Placement, whose three campuses are located at 1 W. 4th St., New York, N.Y. 10012; at 3101 Clifton Ave., Cincinnati, Ohio 45220; and at 3077 University Mall, Los Angeles, Calif. 90007. (Reform)

Reconstructionist Rabbinical College, Church Road and Greenwood Avenue, Wyncote, Pa. 19095.

Roman Catholic Priests

(D.O.T. 120.007-010)

Nature of the Work

Roman Catholic priests attend to the spiritual, pastoral, moral, and educational needs of the members of their church. They deliver sermons, administer the sacraments of marriage and of penance, and preside at liturgical functions, such as funeral services. They also comfort the sick, console and counsel those in need of guidance, and assist the poor.

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 home. Many priests direct and serve on church committees, work in civic and charitable organizations, and assist in community projects.

The two main classifications of priests—diocesan (secular) and religious—have the same powers acquired through ordination by a bishop. The differences lie in their way of life, their type of work, and the church authority to whom they are immediately subject. Diocesan priests generally work individually in parishes assigned by the bishop of their diocese. Religious priests generally work as part of a religious order, such as the Jesuits, Dominicans, or Franciscans. They may engage in specialized activities, such as teaching or missionary work, assigned by 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 church's institutions of higher education and many high schools, whereas diocesan priests are usually 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.

Working Conditions

Priests spend long and irregular hours working for the church and the community.

Religious priests are assigned duties by their superiors in their particular orders. Some religious priests serve as missionaries in foreign countries where they may live under difficult and primitive conditions. Some live a communal life in monasteries where they devote themselves to prayer, study, and assigned work.

Diocesan priests are "on call" at all hours to serve their parishioners in emergency situations. They also have many intellectual duties including study of the scriptures and keeping up with current religious and secular events in order to prepare sermons. Diocesan priests are responsible to the bishop in the diocese.

Employment

There were approximately 58,000 priests in 1982, according to the National Conference of Catholic Bishops. There are priests in nearly every city and town and in many rural communities. The majority are in metropolitan areas where most Catholics reside. Large numbers of priests are located in communities near Catholic educational and other institutions.

Training and Other Qualifications

Preparation for the priesthood generally requires 8 years of study beyond high school in one of 540 seminaries. Preparatory study 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. Latin is required and modern languages are 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 include sacred scripture; dogmatic, moral, and pastoral theology; homiletics (art of preaching); church history; liturgy (Mass); and canon law. Fieldwork experience usually is required; in recent years, this aspect of a priest's training has been emphasized. Diocesan and religious priests attend different major seminaries where slight variations in the training reflect the differences in their duties. Priests commit themselves not to marry.

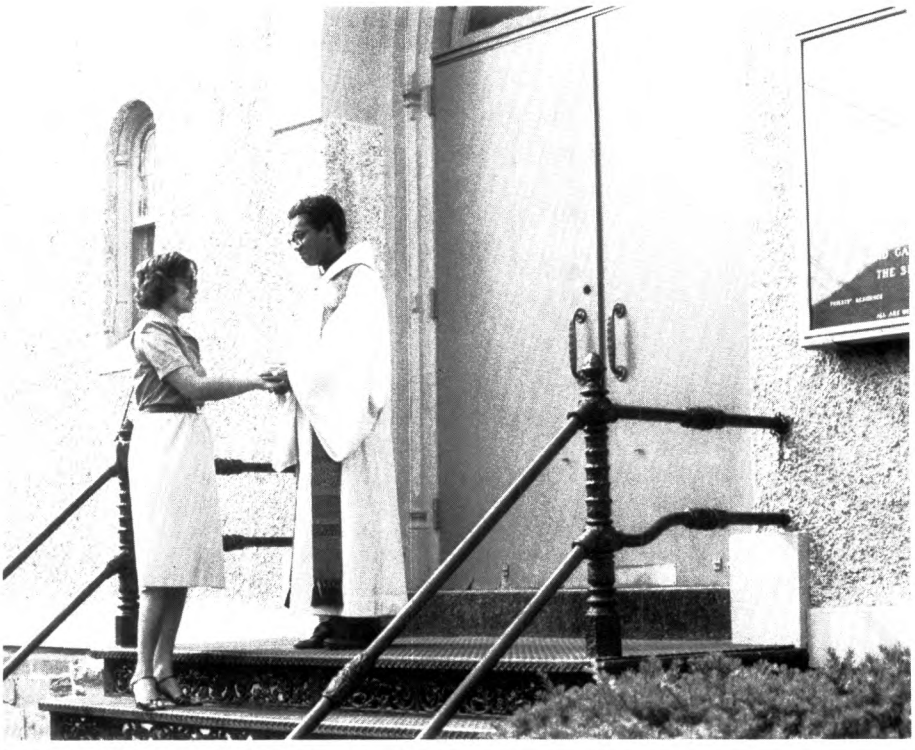
Postgraduate work in theology is offered at a number of American Catholic universities or at ecclesiastical universities around the world, particularly in Rome. Also, many priests do graduate work in fields unrelated to theology. Priests are encouraged by the Catholic Church to continue their studies, at least informally, after ordination. In recent years, continuing education for ordained priests has stressed social sciences, such as sociology and psychology.

Young men never are denied entry into seminaries because of lack of funds. In seminaries for secular priests, scholarships or loans are available. Those in religious seminaries are financed by contributions of benefactors.

A newly ordained secular priest usually works as an assistant pastor or curate. Newly ordained priests of religious orders are assigned to the specialized duties for which they are trained. Depending on the talents, interests, and experience of the individual, many opportunities for greater responsibility exist within the church.

Job Outlook

More priests will be needed in the years ahead to provide for the spiritual, educational, and



Spiritual guidance is an important priestly function.

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social needs of the increasing number of Catholics. During the past decade, 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, die, or leave the priesthood. This situation is likely to persist and perhaps worsen, if the sharp drop in seminary enrollment continues, and if an increasing proportion of priests retires as expected.

In response to the shortage of priests, certain traditional functions may now be performed by lay deacons and by teams of clergy and laity. Presently over 6,000 lay deacons have been ordained to preach and perform liturgical functions such as distributing holy communion and reading the gospel at the Mass. Teams of clergy and laity undertake nonliturgical functions such as hospital visits and meetings. These trends are expected to increase. Priests will continue to offer Mass, administer sacraments, and hear confession, but probably will be less involved in teaching and administrative and community work.

Earnings

Diocesan priests' salaries vary from diocese to diocese. Based on limited information, most salaries range from $2,300 to $4,400 a year. The diocesan priest also may receive a car allowance of $25 to $50 a month, free room and board in the parish rectory, and fringe benefits such as group insurance and retirement benefits in the diocese.

Religious priests take a vow of poverty and are supported by their religious order.

Priests who do special work related to the church, such as teaching, usually receive a partial salary which is less than a lay person in the same position would receive. The difference between the usual salary for these jobs and the salary that the priest receives is called "contributed service." In some of these situations, housing and related expenses may be provided; in other cases, the priest must make his own arrangements. Some priests doing special work may receive the same compensation that a lay person would receive.

Related Occupations

Roman Catholic priests advise and counsel individuals and groups regarding their religious as well as personal, social, and vocational development. Other occupations involved in this type of work include social workers, clinical and counseling psychologists, teachers, and counselors.

Sources of Additional Information

Young men interested in entering the priesthood should seek the guidance and counsel of their parish priests. 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 through the office of the local pastor or bishop.

Occupational information about the Roman Catholic priesthood can also be obtained from:

National Catholic Vocation Council, 1307 S. Wabash Avenue, Chicago, Ill. 60605.

OTHER SOCIAL SCIENCE, SOCIAL WORK, RELIGIOUS, AND LAW RELATED OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Directors, religious education and activities	Direct and coordinate activities of various denominational groups to meet religious needs of students and plan, organize, and direct church school programs designed to promote religious education among church membership. Provide counseling and guidance relative to marital, health, financial, and religious problems.	43,000	Little change is expected
Judges	Arbitrate, advise, and administer justice in courts of law. Sentence defendants in criminal cases, on conviction by juries, according to statutes of state or federal government or determine liability of defendants in civil cases.	20,000	About as fast as average
Magistrates	Adjudicate criminal cases not involving penitentiary sentences, and civil cases concerning damages below sum specified by state law. May issue marriage licenses and perform wedding ceremonies.	11,000	More slowly than average

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Teachers, Librarians, and Counselors

Teaching, librarianship, and counseling are "people-oriented" fields that involve helping others learn, acquire information, or gain insight into themselves. Professional positions require a bachelor's degree, as a rule, although some require a master's or doctoral degree.

Teaching is one of the largest occupations in the United States. In 1982, kindergarten and elementary school teachers held 1,366,000 jobs, secondary school teachers held 1,024,000, and college and university teachers held 744,000. Many others held jobs as teachers in preschool programs and nursery schools; in public and private vocational education programs; in dance, music, and art studios; and in other places. Librarianship and counseling are much smaller fields. In 1982, librarians and audiovisual specialists held 157,000 jobs and counselors held 148,000.

Teaching takes place in many different settings, and most people would agree that education is a life long process. But perhaps our most influential educational experiences occur during the period of formal education, beginning in preschool or kindergarten and extending through early adulthood. Teachers help students gain the skills they need to function in the world around them, encouraging them to explore many subjects and master some; to identify interests and values; to learn to make decisions; and to think for themselves.

Librarianship is undergoing profound changes as libraries try to keep up with the information explosion, assimilate new technology, and respond to budget pressures. Many libraries are restructuring services and looking for new ways to share resources. These developments may alter library staffing patterns as well.

Public libraries, long thought of as centers for recreational reading, are enlarging the scope of their activities and finding additional ways to serve the community—as information and referral services, cultural centers, and learning centers or "open universities." School libraries, also called media centers because so much of their collection is not in printed form, have become an integral part of the learning experience in elementary and secondary schools. College and university libraries provide both reference collections for students and support for highly specialized research. Special libraries and documentation centers, which generally tailor services to a single group of users, have led the field in the use of computers for information storage and retrieval. Expertise in library automation is important for all kinds of librarians, however.

Counseling has many dimensions. Counselors provide personal, social, and vocational guidance in a wide range of settings, including schools and colleges, rehabilitation centers, community mental health centers, halfway houses, and counseling centers for women, minorities, veterans, ex-offenders, and alcohol or drug abusers.

Some employers require a master's degree in counseling, counseling psychology, social work, or a related field, but others do not. Peer counseling, which has proved highly effective in many situations, is conducted by individuals who are trained and supervised by professionals. Peer counselors do not ordinarily have professional credentials themselves, however. Moreover, counseling is a normal part of the job for many others in the "helping professions," including members of the clergy, social workers, psychologists, and nurses.

Job prospects in secondary and college and university teaching, librarianship, and guidance and career counseling are expected to be competitive overall, as a result of anticipated enrollment declines and an abundance of qualified jobseekers. Most positions in these fields are in the public sector, where only slow employment growth is expected through 1995. Staff cutbacks in school systems and social service agencies will intensify competition for jobs. Job prospects for elementary school teachers are expected to be more favorable as enrollments start increasing after 1985. Prospects in secondary schools may improve in the early 1990's, as enrollments there begin to increase.

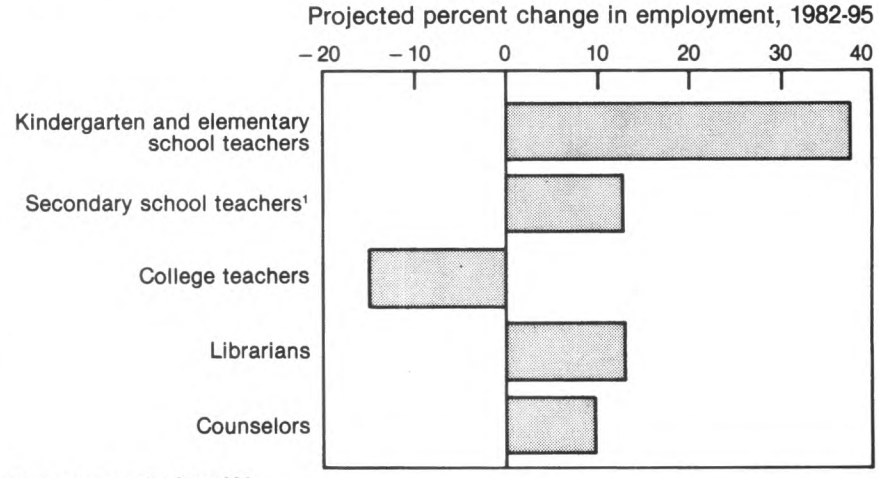
Nonetheless, the teaching occupations in particular are so large that replacement needs alone will generate a substantial number of openings throughout the decade. Furthermore, some specializations and some parts of the country are far more promising than others. Jobseekers who have certain kinds of training—particularly in science and mathematics—or who are willing to relocate will be in a relatively favorable position.

Training and human resource development, a field closely related to teaching, has attracted growing numbers of teachers seeking a career change. Trainers need many of the skills that mark successful teachers; they, too, must be able to design lesson plans, speak in front of groups, and evaluate performance. And trainers should be able to inspire interest and encourage learning. Teachers are among those who have responded to job opportunities in the growing field of employee development. However, training specialists warn that many teachers lack the knowledge of business practices and organizational dynamics needed for a successful career in private industry. For more information, see the statement on personnel and labor relations specialists elsewhere in the *Handbook*.

While library jobs are relatively hard to find, opportunities should be favorable for librarians with knowledge in scientific and technical fields such as law, medicine, and engineering. People with information-handling skills are also in demand in other settings. New information-handling roles, for which many librarians are well qualified, are emerging in business and industry, especially in the rapidly developing "information industry."

More detailed information on job outlook and alternative careers appears in the statements that follow.

Growth in education-related occupations will vary greatly through the mid-1990's.



[1]No growth until after 1990

SOURCE: Bureau of Labor Statistics

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Kindergarten and Elementary School Teachers

(D.O.T. 092.227-010, -014; 094.224-010, .227-010 through -022; 099.224-010)

Nature of the Work

Kindergarten and elementary school teachers play a vital role in the development of children. What is learned or not learned in these early years can shape children's views of themselves and the world, and affect later success or failure in school and work.

Kindergarten and elementary school teachers introduce children to the basics of mathematics, language, science, and social studies. They try to instill good study habits and an appreciation for learning, and observe and evaluate each child's performance and potential. Elementary school teachers may use films, slides, computers or instructional games to help children learn in creative ways. They also arrange class trips, speakers, and class projects.

Teachers keep track of their students' social development and health. They observe each child's behavior and discuss problems—such as habitual resistance to authority—with the parents. Teachers also report health problems to parents and school health officials.

Most elementary school teachers instruct a group of children in several subjects while providing individual attention as much as possible. In some schools, two or more teachers team teach and are jointly responsible for a group of students or for a particular subject. An increasing number of elementary school teachers specialize and teach one or two subjects to several classes. Some teach subjects such as music, art, or physical education, while others concentrate on the special needs of certain groups: Those who have reading problems, or those who do not speak English, for example.

Much of a teacher's work occurs outside the classroom. Teachers generally prepare lessons and grade papers at home, and attend faculty meetings and supervise extracurricular activities after school. They also serve on faculty committees to revise curricula or to evaluate the school's objectives and the students' performance. To stay up to date on educational materials and teaching techniques, they may participate in workshops and other inservice activities or take courses at local colleges and universities.

In many schools, teacher aides do clerical work and supervise lunch and playground activities so that teachers can give more individual attention to students.

Working Conditions

Teachers spend much of their time standing or walking. Kindergarten teachers may join their students on the floor to finger paint, cut out pictures, or do other crafts.

A teacher may often have to deal with disruptive, disrespectful, and sometimes even violent children. This can be physically and emotionally taxing. Giving appropriate attention to disabled pupils also adds to a teacher's load.

Most elementary school teachers work a traditional 2-semester, 10-month school year with a 2-month vacation. Teachers on a 10-month schedule may teach in the summer session or take other jobs. Many enroll in college courses or special workshops. Some teachers in year-round schools work 8-week sessions, are off 1 week between sessions, and have a long mid-winter break. This 12-month schedule makes it difficult for teachers to take supplemental jobs.

In most States the public schools must be in session a minimum number of days, usually 180.

Job prospects for kindergarten and elementary school teachers are expected to improve.

Most States as well as the District of Columbia have tenure laws that protect the jobs of teachers who have taught satisfactorily for a certain number of years. A teacher normally must serve a probationary period of 3 years before attaining tenure. Tenure is not an automatic guarantee of job security, but it does provide some protection.

Employment

Kindergarten and elementary school teachers held 1,366,000 jobs in 1982. Most elementary school teachers work in public schools that have students in kindergarten through grade six; however, some teach in middle schools that cover the 3 or 4 years between the lower elementary grades and 4 years of high school. Less than 14 percent of elementary school teachers work in private schools.

Since kindergarten and elementary school teachers work directly with students, their employment is distributed geographically much the same as population.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require public elementary school teachers to be certified by State education authorities. Some States require teachers in private and parochial schools to be certified as well. Generally, certification is granted by the State Board of Education, the State Superintendent of Education, or a Certification Advisory Committee.

Teachers may be certified to teach either the early childhood grades (usually nursery school through the third grade) or the elementary grades (grades 1 through 6 or 8). Some teachers obtain certification to teach special education or reading at the elementary school level.

Requirements for certification vary by State, and school systems may have additional hiring requirements. In all States and the District of Columbia, however, public kindergarten or elementary school teachers must have a bachelor's degree from an institution with an approved teacher education program. Teacher training programs include a variety of liberal arts courses as well as student teaching and prescribed professional education courses. Almost half of all States require teachers to earn graduate degrees within a certain number of years after being hired.

Twenty-one States require (or will require by 1985) applicants for certification to be tested for competency either in basic skills, subject matter, teaching skills, or a combination of these. Half the States have health, citizenship, or character requirements. Complete information on requirements for elementary school teaching is available from State departments of education or superintendents of schools.

Information about whether a particular teacher training program is approved can be obtained from the institution offering the training or from the State department of education. Many States have reciprocity agreements that allow teachers who are certified in one State to become certified in another.

Kindergarten and elementary school teachers should be creative, dependable, patient and

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competent in handling classroom situations. Most important, they should be vitally interested in the educational and emotional development of children.

As teachers gain experience, they may advance to supervisory, administrative, or specialized positions within the school system. Often, however, these positions require additional training and certification and the number of positions is limited. As a result, for most teachers, advancement consists of higher pay rather than additional responsibility or a higher position.

Job Outlook

Job prospects for kindergarten and elementary school teachers are expected to begin improving by the mid-1980's. If the number of new college graduates prepared to teach in elementary school remains at current levels there may be more openings than qualified applicants after the mid-1980's. Although employment is expected to grow, the major source of job openings will be the need to replace teachers who leave the profession. In 1980, about one-half of those who left teaching did so for family responsibilities; about one-third transferred to other occupations.

Employment in kindergarten and elementary school teaching is expected to increase faster than the average for all occupations, primarily because of rising enrollments starting in 1985 and continuing through 1995. Additional positions also are expected as a result of lower pupil-teacher ratios.

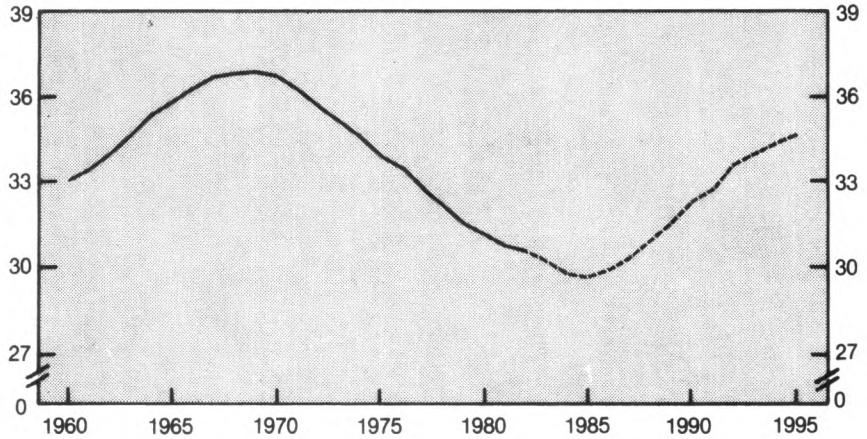
Enrollment levels and employment of classroom teachers are closely associated. Because of fewer births in the 1960's, elementary school enrollments have been declining since 1967, when they peaked at nearly 32 million. Although birth rates are not projected to increase substantially from the level of the mid-1970's, the number of births is expected to rise during the decade as more women enter the prime childbearing ages. The National Center for Education Statistics projects that by 1983, the downward enrollment trend will halt at a level of about 27.1 million. Thereafter, elementary school enrollments will advance to more than 33 million by 1995.

Enrollment growth will not occur at the same rate in all areas of the country, however. Largely because of migration to the South and West, population growth (and therefore the increase in enrollments) is expected to be greater in those regions.

Whether an elementary school teacher "shortage" develops in the mid-1980's depends not only on factors that affect demand for teachers, but on supply as well. The basic sources of teacher supply—recent graduates qualified to teach at the elementary school level and former teachers seeking reentry to the occupation—are likely to respond to changes in the demand for elementary school teachers. The greater availability of jobs beginning in the mid-1980's may encourage more people to prepare for elementary school teaching and attract more people from the teacher reserve pool. The reserve pool is very large because many elementary school teachers are women who leave teaching for household responsibilities and also because there had been an oversupply of these teachers for years. In 1980, more than one-third of those who entered teaching had not worked the previous year because of household responsibilities. Also, during the same year, about two-fifths of all entrants transferred from other jobs. If such supply responses occur, a shortage of elementary school teachers may not develop. In addition secondary school teachers may turn to elementary school teaching. However, training requirements for secondary school teachers are substantially different from those for elementary school teachers, and relatively few secondary school teachers are expected to take additional training for elementary level certification. Employment of teachers is also sensitive to changes in State and local expenditures for education. Pressure from taxpayers to limit tax and spending increases is likely to continue through the mid-1990's and consequently affect the hiring of additional teachers.

The decline in the elementary school age population will be reversed around 1985.

Population 5 to 13 years of age (thousands)



SOURCE: Bureau of the Census

Earnings

According to the National Education Association, public elementary school teachers averaged $20,042 a year in 1982-83. Generally, the Mid-Atlantic and the Far Western States paid the highest salaries.

Collective bargaining agreements cover an increasing number of teachers. In 1980, 31 States and the District of Columbia had laws that required collective bargaining in teacher contract negotiations, and an additional 8 States permitted such bargaining. Most public school systems that enroll 1,000 students or more bargain with teacher organizations over wages, hours, and the terms and conditions of employment.

Related Occupations

Kindergarten and elementary school teaching requires a wide variety of skills and aptitudes, including organizational and administrative abilities; a talent for working with children; communication skills; the power to influence, motivate, and train others; creativity; and leadership ability. Other occupations that use these aptitudes include child care attendants; trainers and employee development specialists; employment interviewers; librarians; personnel managers; public relations representatives; social workers; and career, vocational, and school counselors.

Sources of Additional Information

Information on certification requirements is available from local school systems and State departments of education.

Federal financial aid is available for education students preparing to work with the handicapped. For information, enclose $1.00 and request *Special Education Career Preparation* from:

Closer Look, 1201 16th St. NW., Washington, D.C. 20036.

Information on teachers' unions and education-related issues can be obtained from:

American Federation of Teachers, 11 Dupont Circle NW., Washington, D.C. 20036.

General information on the teaching professions can be obtained from local or State affiliates of the National Education Association.

A list of colleges and universities accredited by the National Council for Accreditation of Teacher Education can be obtained from:

National Council for Accreditation of Teacher Education, 1919 Pennsylvania Ave. NW., Suite 202, Washington, D.C. 20006.

Secondary School Teachers

(D.O.T. 091.221-010, .277-010; 094.244-010, .277-010 through -022; and 099.224-010)

Nature of the Work

The high school years are a time of transition from childhood to adulthood. Secondary

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school teachers facilitate this process. They help students delve more deeply into subjects introduced in elementary school and learn more about themselves and the world.

Secondary school teachers instruct students in a specific subject, such as English, Spanish, mathematics, history, or biology. They may teach a variety of related courses. Social studies teachers, for example, may instruct two 9th grade classes in American History, two 12th grade classes in Contemporary American Problems, and another class in World Geography. For each class, teachers develop lesson plans; prepare, give, and grade examinations; and arrange special activities, such as a class project to devise an urban redevelopment plan for a city.

Teachers design their classroom presentations to meet the individual needs and abilities of as many as 150 students in five different classes. They may arrange tutoring for students or give advanced assignments for highly motivated pupils.

Teachers use a variety of instructional materials including films, slides, and computer terminals. They may arrange field trips, such as planetarium visits to supplement classroom work on astronomy.

Science teachers also supervise laboratory work and vocational education teachers teach shop classes to give students "hands-on" experience with instruments, tools, and machinery.

In addition to classroom teaching, secondary school teachers prepare lessons and grade papers at home, oversee study halls and homerooms, supervise extracurricular activities, and attend meetings with parents and school personnel. Teachers also participate in workshops and college classes to keep up to date on their subject specialty and on developments in education.

Working Conditions

Teaching involves long periods of standing and talking and can be both physically and mentally tiring. Dealing with disruptive students can also be emotionally exhausting.

Since teachers spend much time in activities outside the classroom, they may work over 40 hours a week. Most teachers work the traditional 10-month school year with a 2-month vacation. Teachers on a 10-month schedule may teach in the summer session or take other jobs. Many enroll in college courses or special workshops. Teachers in districts with a year-round schedule work 8 weeks, are on vacation for 1 week, and have a 5-week midwinter break. In most States, schools must be in session a minimum number of days, usually 180.

The District of Columbia and most States have tenure laws that protect the jobs of teachers who have taught satisfactorily for a certain number of years. A teacher normally must serve a probationary period of 3 years before attaining tenure. Tenure is not an automatic guarantee of job security, but it does provide some protection.

Employment

Secondary school teachers held 1,024,000 jobs in 1982. More than 90 percent taught in public schools. Since teachers work directly with students, their employment is distributed much the same as the population.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require public secondary school teachers to be certified. Many States require teachers in private and parochial schools to be certified as well. Usually certification is granted by the State Board of Education, the State Superintendent of Education, or a Certification Advisory Committee.

Requirements for certification to teach at the secondary school level vary by State, and school systems may have additional requirements. However, in all States and the District of Columbia, teachers need a bachelor's degree from an approved teacher training program with a prescribed number of credits in the subject they plan to teach. They must also complete student teaching and other professional education courses. Almost half the States require teachers to obtain graduate degrees within a certain time after being hired.

Twenty States require (or will require by 1985) applicants for teacher certification to be tested for competency either in basic skills, subject matter, teaching skills, or a combination of these. Many States also have health, citizenship, or character requirements. Information on certification requirements for secondary school teaching is available from any State department of education or superintendent of schools.

Information about whether a particular teacher training program is approved can be obtained from the institution offering the training or from the State department of education. Many States have reciprocity agreements that allow teachers who are certified in one State to become certified in another.

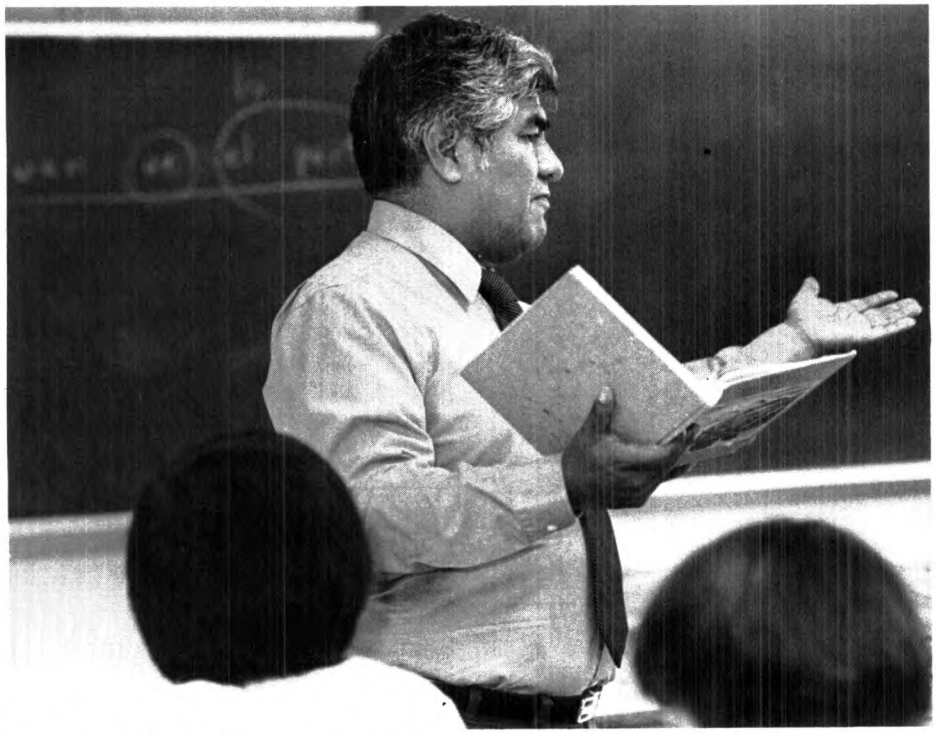
Secondary school teachers should be good at working with young people, knowledgeable in their special subject, and able to motivate students and to impart knowledge to them.

With additional preparation and certification, experienced teachers may be able to move into positions as school librarians, reading specialists, curriculum specialists, or guidance counselors. However, for most secondary school teachers, advancement takes the form of a higher salary rather than a different job. Relatively few teachers move into administrative or supervisory positions in a public school system. To do so usually requires at least 1 year of graduate education, several years of classroom teaching, and sometimes a special certificate.

Job Outlook

Prospective secondary school teachers will face keen competition for jobs through the early 1990's. Employment opportunities should improve thereafter. If the number of new college graduates prepared to teach in secondary school remains at current levels, the supply of persons qualified to teach will greatly exceed requirements until the early 1990's, and many qualified graduates will have to consider alternatives to secondary school teaching. College students interested in becoming secondary school teachers should take courses that apply to jobs outside teaching. A willingness to relocate may be an advantage in obtaining a teaching job.

The prime sources of teacher supply are recent college graduates qualified to teach secondary school and former teachers seeking to reenter the profession. Although reentrants have experience in their favor, many schools may prefer to hire new graduates who com-



All states require public secondary school teachers to be certified.

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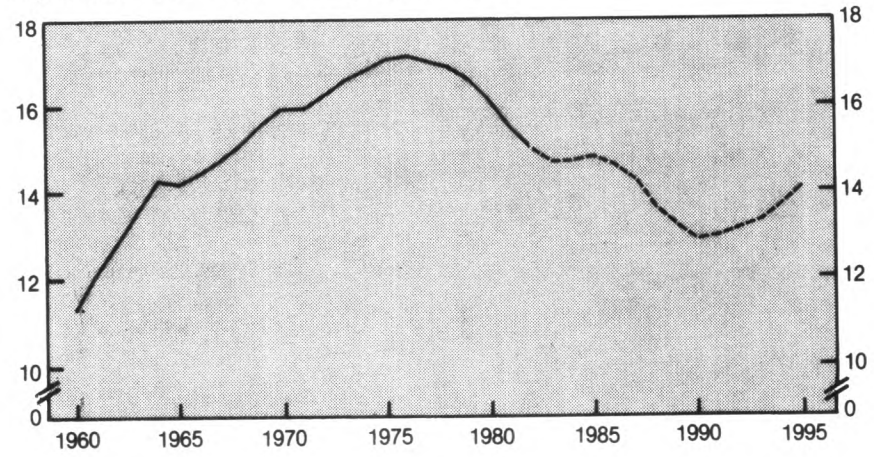
The decline in the high school age population will not be reversed until the early 1990's.



SOURCE: Bureau of the Census

mand lower salaries and whose training is more recent.

Employment of secondary school teachers is expected to decline throughout the 1980's and start increasing during the early 1990's. Pupil enrollment is the basic factor underlying the demand for teachers. Because of fewer births in the early 1960's secondary school enrollments began declining in the mid-1970's. The National Center for Education Statistics projects that enrollment in secondary schools will continue to decline through 1990. Enrollments will begin increasing after 1990, reflecting a rise in births after the mid-1970's. Enrollment growth will vary by region. Population migration to the South and West will result in smaller enrollment decline there; conversely, population losses in Northeast and North Central States will result in greater enrollment declines in these States.

Since secondary school enrollments are expected to decline through 1990, nearly all openings for secondary school teachers will stem from the need to replace teachers who leave the profession. In 1980, more than 40 percent of secondary school teachers who left the profession transferred to other occupations; about 30 percent left to assume household responsibilities; the rest retired, became unemployed, or went back to school.

Employment of teachers is sensitive to changes in State and local expenditures for education. Pressure from taxpayers to limit tax and spending increases are likely to continue through the mid-1990's, affecting the number of teachers employed.

Although the overall outlook for secondary school teachers indicates a highly competitive market, employment conditions may be favorable in certain fields. Science and mathematics teachers are in short supply because employers in private industry and government offer higher salaries to people trained in mathematics and science. Some schools also report difficulty in finding enough teachers qualified in special education, vocational education, and bilingual education.

Earnings

According to the National Education Association, public secondary school teachers averaged $21,100 a year in 1982-83. Generally, salaries were highest in the Mid-Atlantic region and in the Far West.

Collective bargaining agreements cover an increasing number of teachers. In 1982, 32 States and the District of Columbia had laws that required collective bargaining in teacher contract negotiations, and an additional 8 States permitted such bargaining.

In some schools, teachers receive extra pay for coaching sports, and working with students in extracurricular activities such as music, drama, or school publications. Some teachers earn extra income by work in the school system during summer sessions. Others hold summer jobs outside the school system.

Related Occupations

Secondary school teaching requires a wide variety of skills and aptitudes, including organizational, administrative, and recordkeeping abilities; research and communication skills; the power to influence, motivate, and train others; and creativity. Other occupations which use these aptitudes include: School administrators, counselors, trainers and employee development specialists, employment interviewers, librarians, personnel managers, public relations representatives, sales representatives, and social workers.

Sources of Additional Information

Information on certification requirements and approved teacher training institutions is available from State departments of education.

Federal financial aid is available for education students preparing to work with the handicapped. For information, enclose $1.00 and request *Special Education Career Preparation* from:

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College and University Faculty

(D.O.T. 090.227-010; and 099.224-010)

Nature of the Work

Millions of people enroll in college every year for personal enrichment or for skills needed for a job. Although the majority are recent high school graduates, the number of older students on campus is growing. Many are homemakers preparing to enter or reenter the work force; others have returned to school to obtain courses for advancement in their present job or for a career change.

College and university faculty members provide instruction in particular fields of study to meet the needs of these students. Faculty members generally teach several different courses in the same field—freshman composition and 18th century English literature, for example. Many instruct undergraduates only, while some instruct both undergraduates and graduate students. Still fewer instruct only graduate students. Usually, the more experienced and educated faculty members teach the higher level classes.

College and university faculty members use various teaching methods depending on the subject, interest, and the level of their students. They may lecture in classrooms that seat hundreds of students, lead seminars for only a few students, or supervise students in laboratories. Some use teaching assistants who may lead discussion sections or grade exams. Closed-circuit television, computers, and other teaching aids are frequently used.

College faculty members keep up with developments in their field by reading current literature and participating in professional activities. They also conduct and publish the results of their own scholarly research. Some college faculty members may experience a serious conflict between their responsibilities to their students and the pressure to "publish or perish." Those at universities generally spend the most time doing research; those in 2-year colleges, the least.

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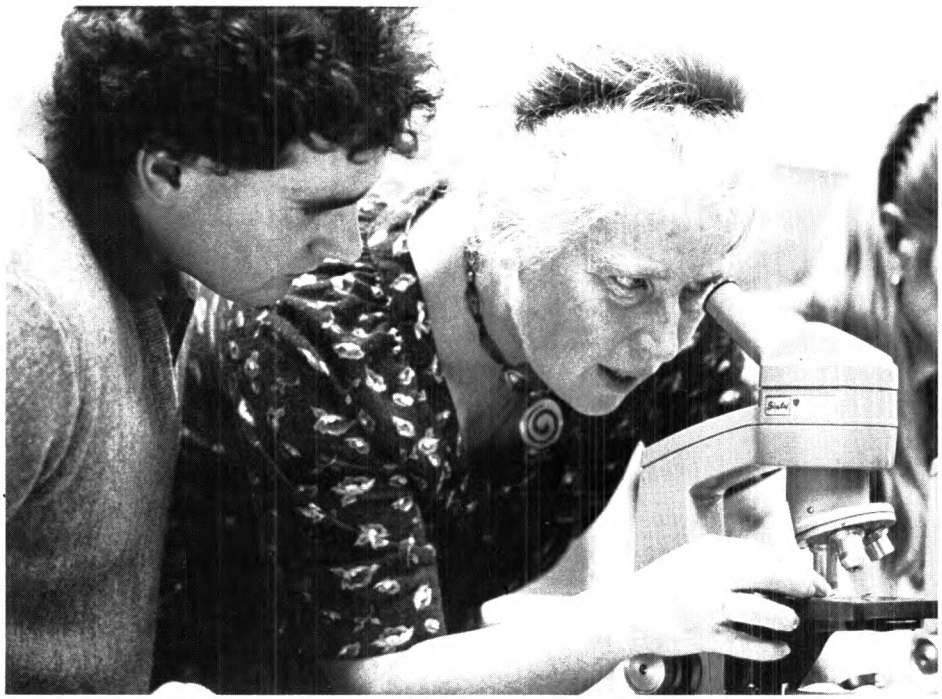

Most college faculty members enter the profession as instructors and must have at least a master's degree.

In addition to preparation, instruction, and research, college and university faculty members may advise students and work with student organizations. Department heads also have administrative duties.

Working Conditions

College faculty members generally have flexible schedules, dividing their time among teaching, research, advising, and administrative responsibilities. They may work staggered hours and teach classes at night. The normal teaching load usually is heavier in 2-year and community colleges where less emphasis is placed on research and publication.

Over 90 percent of all full-time college and university faculty work in institutions that have tenure systems (the assurance of continuing employment with freedom from dismissal without cause and due process). Nearly two-thirds of these faculty members are tenured. Under a tenure system, a faculty member usually receives 1-year contracts during a probationary period lasting at least 3 years and ordinarily no more than 7 years; some universities award 2- or 3-year contracts. After the probationary period, institutions consider faculty members for tenure. Declining enrollments and budgetary constraints, however, have made tenure increasingly difficult for faculty members to gain. Colleges and universities are turning to short-term contracts and to part-time faculty to save money.

Few professions offer vacation arrangements as attractive as those in teaching. In addition to the summer months during which faculty members may conduct research, prepare course and teaching materials, teach short-term summer classes, travel, or pursue hobbies, they also have breaks during other school holidays. College faculty also have the intangible rewards of being exposed to new ideas and sharing in the growth and development of students.

Employment

College and university faculty held 744,000 jobs in 1982. About two out of three faculty members holding the rank of professor, associate professor, assistant professor, or instructor were full time, and almost one out of three were part time instructional staff. Approximately 30,000 persons were full-time junior instructors. In addition, thousands of graduate students, employed as assistant instructors, teaching fellows, teaching assistants, or laboratory assistants—taught part time.

Public institutions, which constitute less than one-half of all colleges and universities, employ over 70 percent of all full-time instructional faculty. They employ about two-thirds of the full-time faculty in all universities and 4-year colleges, and over 90 percent in all 2-year institutions.

Nearly one-third of full-time faculty teach in universities; almost one-half work in 4-year colleges; and over one-fifth teach in 2-year colleges.

A few part-time faculty work in more than one institution of higher education. Others are primarily employed outside of an academic setting—in government, private industry, or in nonacademic research. These people—sometimes referred to as "adjunct faculty"—may teach as little as one course a semester.

Training, Other Qualifications, and Advancement

The overwhelming majority of full-time college and university faculty are classified in four academic ranks: Professors, associate professors, assistant professors, and instructors. A small proportion are classified as lecturers.

Most faculty members enter the profession as instructors and have at least a master's degree. Because competition for positions is so keen, many 4-year colleges and universities consider only doctoral degree holders for entry level academic appointments. At 2-year institutions a doctorate may not be considered advantageous.

Doctoral programs usually require 4 years or more of study beyond the bachelor's degree, including intensive research for a doctoral dissertation that makes an original contribution to the candidate's field of study. A working knowledge of one or more foreign languages (or computer languages) and, in many fields, advanced mathematical and statistical techniques are often required as well. Students should consider carefully their academic potential and motivation before beginning doctoral studies.

Advancement through the academic ranks in 4-year institutions usually requires a doctorate plus college teaching experience, even in institutions that hire master's degree holders as instructors.

Academic, administrative, and professional contributions affect advancement opportunities in this field. Research, publication, consulting work, and other forms of professional recognition all have a bearing on a college faculty member's chances of promotion.

College faculty need inquiring, analytical minds and a strong desire to pursue and disseminate knowledge. As teachers and researchers, they should be able to communicate well, both orally and in writing. And as models for their students, they should be dedicated to the principles of academic integrity and intellectual honesty. College faculty need to be open to new ideas—from their students, peers, and the nonacademic community.

Job Outlook

Employment of college and university faculty is expected to decline through the mid-1990's. The basic factor underlying the demand for college faculty is enrollment. During the 1960's and the 1970's, enrollments rose and employment of college faculty increased. The steady rise in the number of persons attending college reflected not only growth in the number of 18- to 24-year-olds, but an increase in the proportion of college-age persons who actually went to college. Enrollments, which peaked during the early 1980's, are expected to decline through the mid-1990's as the traditional college-age population not only decreases but the proportion of those going to college remains unchanged or declines slightly. A growing number of adults have entered college in recent years, many on a part-time basis, but adult enrollments are not expected to completely offset the decline in traditional-age college students. Employment opportunities may be better in community colleges that emphasize programs for adult learners. In general, however, fewer students will mean fewer college faculty members.

Because employment of college and university faculty will decline, job openings will result entirely from replacement needs. In any

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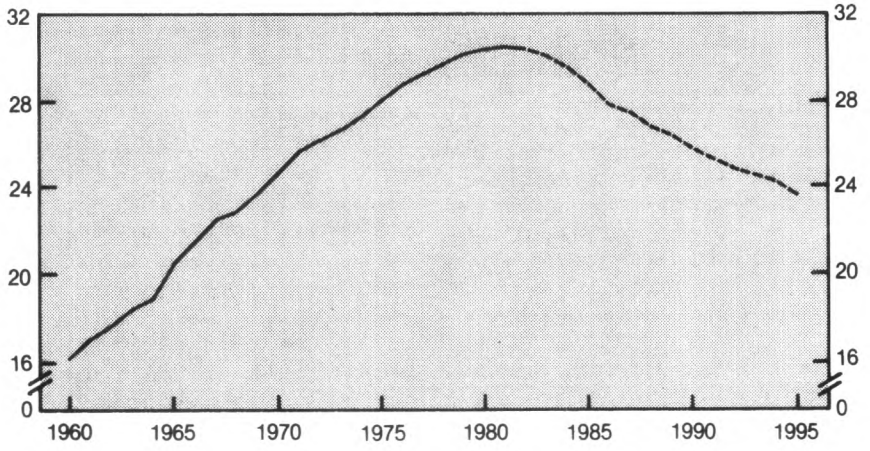
The college age population is expected to decline through the mid-1990's.

Population 18 to 24 years of age (thousands)



SOURCE: Bureau of the Census

given academic institution, the number of vacancies will be influenced by the age of current faculty, tenure patterns and policies, and retirement practices.

Competition for openings will be extremely keen, particularly for faculty positions in the largest and most prestigious institutions. The number of Ph.D. recipients alone will exceed greatly the number of openings for college faculty through the mid-1990's. Many graduates who succeed in finding academic jobs may have to accept part-time or short-term appointments that offer little hope of tenure.

Some fields will offer brighter employment prospects for college faculty than others, of course. Departments that report shortages include engineering, computer science, business administration, and law—areas that offer very attractive jobs outside the academic setting. Employment of college faculty is related to the non-academic job market in other fields in still another way: There is an "echo effect" as favorable job prospects in a particular field—accounting, for example—cause large numbers of students to sign up for courses, thus creating a demand for more teachers. However, changes in the job market, especially in fields like engineering that are subject to cyclical fluctuations, may cause a field temporarily to lose its popularity with college students—and thereby reduce demand for faculty.

During the next decade an increasing proportion of prospective college and university faculty members will have to seek nonacademic positions. And some persons holding graduate degrees may have to enter positions that have not previously required a master's degree or a Ph.D.

Earnings

Earnings vary widely according to faculty rank and type of institution. Faculty members in 4-year institutions earn higher salaries, on the average, than those in 2-year schools. According to a 1981-82 survey conducted by the National Center for Education Statistics, salaries for all full-time faculty on 9-month contracts averaged around $25,500; professors, $33,400; associate professors, $25,300; assistant professors, $20,600; and instructors, $16,500.

Since over 85 percent of full-time faculty members have 9-month contracts, many have additional summer earnings from consulting, teaching, research, writing for publication, or other employment. Royalties and fees for speaking engagements may provide additional earnings.

Some college and university faculty members enjoy benefits offered by few other professions, including tuition waivers for dependents, housing allowances, travel allowances, and paid sabbatical leaves. In many institutions, faculty members are eligible for a sabbatical leave after 6 or 7 years of employment.

Related Occupations

College and university faculty function both as teachers and researchers. They must have an aptitude for communicating information and ideas. Related occupations include: Trainers and employee development specialists, writers, consultants, lobbyists, and policy analysts. Their research activities are often similar to those of their colleagues in industry, government, and nonprofit research organizations.

Sources of Additional Information

Professional societies generally provide information on employment opportunities in their particular fields. Names and addresses of these societies appear in the statements on specific occupations elsewhere in the *Handbook*.

Answers to questions pertaining to college and university teaching can be obtained from:

American Association of University Professors, One Dupont Circle, NW., Suite 500, Washington, D.C. 20036.

Librarians

(D.O.T. 100 except 100.367-018)

Nature of the Work

Librarians make information available to people. They serve as a link between the public and the millions of sources of information by selecting and organizing materials and making them accessible.

Library work is divided into two basic functions: User services and technical services. Librarians in user services—for example, reference and children's librarians—work directly with users to help them find the information they need. Librarians in technical services—such as acquisitions librarians and catalogers—are primarily concerned with acquiring and preparing materials for use and deal less frequently with the information user.

The size of the collection affects the scope of the job. In small libraries or information centers, librarians generally handle all aspects of the work. They select, purchase, and process materials; publicize services; provide reference help to groups and individuals; supervise the support staff; prepare the budget; and oversee other administrative matters. In large libraries, librarians specialize in a single area, such as acquisitions, cataloging, bibliography, reference, circulation, or administration. Or they may handle special collections.

Building and maintaining a strong collection are essential activities in any library, large or small. *Acquisitions librarians* (D.O.T. 100.267-010) select and order books, periodicals, films, and other materials. To keep abreast of current literature, they read book reviews, look over publishers' announcements and catalogs, confer with booksellers, and seek advice from library users. A knowledge of book publishing and business acumen are important, for librarians are under pressure to get as much for their money as possible.

After materials have been received, other librarians prepare them for use. *Classifiers* (D.O.T. 100.367-014) classify materials by subject matter. They may skim through publications and assign classification numbers. *Catalogers* (D.O.T. 100.387-010) supervise assistants who prepare cards or other access tools that indicate the title, author, subject, publisher, date of publication, and location in the library. The cards are then filed in the card catalog or other appropriate storage unit.

Bibliographers (D.O.T. 100.367-010), who usually work in research libraries, compile lists of books, periodicals, articles, and audiovisual materials on particular subjects. They also recommend materials to be acquired in subject areas with which they are familiar. *Special collections librarians* (D.O.T. 100.267-014) collect and organize books, pamphlets, manuscripts, and other materials in a specific field, such as rare books, genealogy, or music. From time to time, they may prepare reports and exhibits to inform scholars and other researchers about important additions to the collection.

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Librarians are also classified according to the type of library in which they work: Public libraries, school library/media centers, academic libraries, and special libraries.

Public librarians serve people of all ages and from all walks of life. Increasingly, public librarians provide materials and services to specific groups, including persons who, because of physical handicaps, cannot use conventional print materials. The professional staff of a large public library system may include the chief librarian, an assistant chief, and division heads who plan and coordinate the work of the entire system. The system also may include librarians who supervise branch libraries and specialists in acquisitions, cataloging, special collections, and user services.

Some public librarians work with specific groups of readers. *Children's librarians* (D.O.T. 100.167-018) find materials children will enjoy and show them how to use the library. They may plan and conduct special programs such as story hours or film programs. They often work with school and community organizations. *Adult services librarians* suggest materials suited to the needs and interests of adults. They may help to conduct education programs, such as community development, public affairs, creative arts, problems of the aging, and home and family. *Young adult librarians* (D.O.T. 100.167-034) 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 music. They also may coordinate the library's work with school programs. *Community outreach librarians* and *bookmobile librarians* (D.O.T. 100.167-014) develop library services to meet the needs of special groups within the community. They might arrange for materials to be brought to a migrant labor camp, an inner city housing project, or a nursing home, for example.

School librarians (D.O.T. 100.167-030) teach students how to use the school library/media center. Working with teachers and media specialists, school librarians 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 materials. Increasingly, the library/media center is viewed as an integral part of the school's overall instructional program, and many school librarians work closely with classroom teachers in curriculum development. They assist teachers in developing study units and participate in team teaching.

In large high schools and in many community colleges, the media center's collection of films, tapes, cassettes, records, and other materials is maintained by a *school library media specialist* (D.O.T. 100.167-030) or an *audiovisual librarian* (D.O.T. 100.167-010). Media center professionals also develop audiovisual materials and work with teachers on curriculum.

Academic librarians serve students, faculty members, and researchers in colleges and universities. They work closely with members of the faculty to ensure that the general collection includes reference materials required for the hundreds of courses that might be offered during a particular academic year. They also maintain the quality of the collection in research areas for which the institution is noted.

A master's degree in library science (M.L.S.) is necessary for professional positions in most public, academic, and special libraries.

Special librarians (D.O.T. 100.167-026) work in information centers or libraries maintained by government agencies and corporate firms such as pharmaceutical companies, banks, law firms, advertising agencies, medical centers, and research laboratories. They build and arrange the organization's information resources to suit the needs of their users. Often, the collection is highly specialized, being limited to subjects of particular interest to the firm. Special librarians may conduct literature searches, compile bibliographies, or prepare abstracts. In scientific and technical libraries in particular, computerized data bases are an important and much-used part of the collection. Maintaining these, and assisting users in retrieving information that has been stored in a computer's memory, are increasingly important parts of the special librarian's job.

The staff of a technical library or documentation center may also include *information scientists* (D.O.T. 109.067-010). Although they work closely with special librarians, information scientists must possess a more extensive technical and scientific background and a knowledge of various techniques for handling information. They abstract complicated information into condensed, readable form, and interpret and analyze 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 microfilm technology.

Technological innovations are beginning to alter traditional patterns of library organization, and eventually may affect staffing as well. A growing number of libraries are tying into remote computer data bases through their computer terminals. The idea of serving users by providing them with access to a variety of commercial data banks took hold initially in corporate libraries and information centers. However, the practice has spread and now some public and academic libraries, too, are linked to commercial data bases. The rise of regional library networks also has profound implications for library operations, for the networks make it less important than it once was for a library to own the materials its users want. It doesn't really matter where the original material is located, if it can be accessed remotely by computer or sent by facsimile machines.

Working Conditions

Libraries generally are busy, demanding, even stressful places to work. Contact with people, which often is a major part of the job, can be taxing. Physically, the job may require much standing, stooping, bending, and reaching. Good eye-sight is also important especially for computer work.

Librarians typically work a 5-day, 35- to 40-hour week. Public and college librarians may work some weekends and evenings. School librarians generally have the same workday schedule as classroom teachers. A 35- to 40-hour week during normal business hours is common for special librarians.

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Employment

Librarians held 150,000 jobs in 1982; in addition, audiovisual specialists held 6,300 jobs in library/media centers. School and academic libraries together accounted for roughly 7 out of 10 librarians. Public libraries and special libraries employed the remainder. A small number of librarians served as consultants or administered State and Federal library programs.

Most librarians work in cities and towns. Those attached to bookmobile units serve widely scattered population groups.

Training, Other Qualifications, and Advancement

A master's degree in library science (M.L.S.) is necessary to obtain an entry level professional position in most public, academic, and special libraries. About 120 schools offered such degrees in 1983. However, most employers prefer graduates of one of the 60 library education programs accredited by the American Library Association in U.S. Educational preparation for school librarianship is more diverse, reflecting the considerable differences among the States in standards and certification requirements for public school librarians.

Most graduate schools of library science require graduation from an accredited 4-year college or university and good grades. A broad undergraduate background, with well defined major and minor areas of study, is appropriate preparation for graduate library education. Some library schools require a reading knowledge of at least one foreign language.

A typical graduate program in library science includes basic courses in the foundations of librarianship, including the history of books and printing, intellectual freedom and censorship, and the role of libraries in society. Other basic courses cover material selection and processing; reference tools; and user services. Advanced courses are offered in such areas as resources for children or young adults; classification, cataloging, indexing, and abstracting; library administration; and library automation. Because virtually all aspects of routine library operation are subject to automation, many library schools encourage students to take courses in computer and information science.

The master of library science (M.L.S.) program represents a general, all-round preparation for library work, but some people specialize in a particular area such as archives, media, or library automation. A few M.L.S. degree holders return to library school for an additional year of study to earn a certificate of advanced study. A Ph.D. degree in library science is advantageous for a teaching position or for a top administrative post, particularly in a college or university library or in a large library system.

For those interested in special libraries or research libraries, a master's degree, doctorate, or professional degree in the appropriate subject specialization is highly desirable. And in academic libraries, an advanced degree may be essential for promotion to a senior level position.

State certification requirements for public school librarians vary widely. Most States require that school librarians be certified as teachers. A degree in library science may not be required, for, in many schools, the library has become the "learning resources center" and is staffed by media personnel with a variety of educational backgrounds. Although some media professionals have a bachelor's or master's in library science, others have a degree in media resources, educational technology, or audiovisual communications. State departments of education can provide information about specific requirements.

Some States require certification of public librarians employed in municipal, county, or regional library systems. State library agencies can provide information about these requirements.

In the Federal Government, which currently hires about 120 librarians a year, 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 a passing grade on an examination.

Scholarships for training in library science are available from library schools, large libraries, and library associations. Loans and assistantships also are available.

Because of an abundant supply of qualified jobseekers, employers in some localities now require some experience for what used to be entry level positions. Graduates who have participated in internship programs and work-study programs or who have worked part time may have an employment advantage over other new graduates.

Experienced librarians may advance to administrative positions. A master's degree in business or public administration may help to obtain such positions.

Job Outlook

Employment of librarians is expected to grow more slowly than the average for all occupations through the mid-1990's. Most job openings will result from the need to replace librarians who transfer to other fields, retire, or leave the occupation for other reasons.

The demand for individuals with library skills outside traditional settings is expected to help ease the tight job market for librarians. Furthermore, the number of library school graduates, which has been declining since the mid-1970's, may continue to drift downward. Therefore, the oversupply could abate, and employment prospects brighten.

Employment growth in public libraries is likely to be slower than it has been during the last two decades. Faced with rising materials costs and tighter operating budgets, many libraries are expected to hire fewer additional librarians.

Employment of academic librarians is expected to decline slightly, a reflection of the overall decline in college enrollments expected through the mid-1990's. The situation will vary from institution to institution, however.

In school libraries, a large sector, slow employment growth is foreseen, overall. Elementary school enrollments are projected to rise after 1984; secondary school enrollments will start increasing after 1990. In some communities, declining enrollments and fiscal constraints are likely to result in staff cutbacks, and some school librarians may be transferred to classroom teaching. In other localities, however, population growth will spur demand for educational personnel, including librarians.

Opportunities should be favorable for librarians with specialized knowledge in scientific and technical fields including medicine, law, business, engineering, and the physical and life sciences. These jobs are available in special libraries and research libraries, for the most part. Individuals with expertise in computerized library systems will also be in demand, because of the widespread use of computers to store and retrieve information and to handle routine operations such as ordering, cataloging, and circulation control. Individuals with a background in cataloging or in working with children should also find good job opportunities.

Information management outside the traditional library setting, a rapidly developing field, is expected to offer excellent employment opportunities for library school graduates and practicing librarians with backgrounds in information science and library automation. Private industry, consulting firms, and government agencies all need qualified people to set up and maintain information systems.

Earnings

Salaries of librarians vary by type of library, the individual's qualifications, and the size and location of the library.

Starting salaries of graduates of library school master's degree programs accredited by the American Library Association averaged $15,633 a year in 1981, and ranged from $14,132 in public libraries to $16,748 in special libraries. The median salary for experienced special librarians was $27,000 a year in 1982. The median salary for experienced librarians in college and university libraries was $23,500 in 1983. Librarians in the Federal Government averaged about $28,800 in 1982.

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.

Related Occupations

Librarians play an important role in the transfer of knowledge and ideas by providing people with access to the information they need and want. Jobs requiring similar analytical, organizational, and communicative skills include archivists, information scientists, museum curators, publishers' representatives, research analysts, information brokers, and records managers.

Sources of Additional Information

Information on librarianship, including a listing of accredited education programs and information on scholarships or loans, may be obtained from:

American Library Association, 50 East Huron St., Chicago, Ill. 60611.

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For information on a career as a special librarian, write to:

Special Libraries Association, 235 Park Ave. South, New York, N.Y. 10003.

Material about a career in information science may be obtained from:

American Society for Information Science, 1010 16th St. NW., Washington, D.C. 20036.

Information on graduate schools of library and information science can be obtained from:

Association for American Library and Information Science Education, 471 Park Lane, State College, Pa. 16801.

Information on Federal assistance to schools for library training is available from:

Office of Libraries and Learning Technologies, U.S. Department of Education, 1200-19th St. NW., Washington, D.C. 20208.

Those interested in a position as a librarian in the Federal service should write to:

Office of Personnel Management, 1900 E St. NW., Washington, D.C. 20415.

Information concerning requirements and application procedures for positions in the Library of Congress may be obtained directly from:

Personnel Office, Library of Congress, Washington, D.C. 20540.

State library agencies can furnish information on scholarships available through their offices, requirements for certification, and general information about career prospects in the State. Several of these agencies maintain job "hotlines" which report current openings for librarians in the State.

State boards of education can furnish information on certification requirements and job opportunities for school librarians.

Counselors

(D.O.T. 045.107-010, -014, -038, -042; 090.107-010; and 169.267.026)

Nature of the Work

Counselors help individuals deal with personal, social, educational, and career problems and concerns. Their duties depend on the individuals or groups they serve and the settings in which they work. *School and college counselors* help students understand themselves better—their abilities, interests, talents, and personality characteristics—and help translate these into realistic academic and career options. They may run career information centers and career education programs. They may use tests or other tools to help students understand themselves and their options. High school counselors keep up-to-date on college admission requirements, entrance exams, and financial aid as well as job training in local trade or technical schools and apprenticeship programs. They help students find part-time and summer work and help those who are not going to college to find full-time jobs. They also help students with social, behavioral, and personal problems. They may deal with students individually, or in cases where problems are widespread, as in drug or alcohol abuse, they may initiate group counseling sessions. Counselors often consult and work closely with parents, teachers, school psychologists, school nurses, and social workers. Elementary school counselors work with younger children, observing them during classroom and play activities and conferring with their teachers and parents in order to evaluate their strengths or problems. They work to establish a home and school environment in which the child will learn, grow, and develop. *College counselors and student development specialists* provide a broad range of counseling services in two year community or junior colleges and four year colleges and universities. Counselors also work in college placement offices, dealing with students and alumni. These counselors are generally known as *college career planning and placement counselors*.

Rehabilitation counselors assist physically, mentally, emotionally, or socially handicapped individuals to become self-sufficient and productive citizens. Rehabilitation counselors evaluate their clients' potential for employment and arrange for medical care, rehabilitation programs, occupational training, and job placement. To do this, they learn about their clients by talking with them, evaluating school and medical reports, and consulting with family members. They also confer with physicians, psychologists, and occupational therapists about the types of work their clients could perform. They then recommend an appropriate rehabilitation program and specialized training to help the disabled individual become more independent and more employable. Since employment success is an important goal of rehabilitation counseling, counselors keep in touch with employers about job openings and the training required.

Employment counselors help individuals make wise career placement decisions. Along with their client, they explore his or her education, training, work history, interests, skills, personal traits, and physical capacities. They may arrange for aptitude and achievement tests. These counselors may suggest specific employers and appropriate ways of applying for work, and give advice on resume writing and interviewing. They may contact employers for their clients. After placement, counselors follow up to determine if additional assistance is required.

Mental health counselors help individuals deal with a wide range of personal and social problems such as drug and alcohol abuse, family conflicts, including child and spouse abuse, suicide, work problems, criminal behavior, and problems of aging. They also counsel rape victims, individuals and families trying to cope with illness and death, and people with emotional problems. Mental health counselors work closely with other specialists, including psychiatrists, psychologists, clinical social workers, and psychiatric nurses.

Working Conditions

Rehabilitation and employment counselors generally work a standard 40 hour week. Self-employed counselors and those working in mental health and community agencies often work evenings to counsel clients who work during the day. College career planning and placement counselors may have to work overtime and irregular hours, especially during recruiting periods.

Most school counselors work the traditional 10-month school year with a 2-month vacation,

A counselor advises a student on college search strategy.

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although an increasing number are employed on 10-1/2 or 11-month contracts. They generally have the same hours as teachers.

Since privacy is essential to permit confidential and open discussions with their clients, counselors usually have private offices.

Employment

Counselors held 148,000 jobs in 1982. Almost 2 out of 3 of these jobs were in educational services. Most of these were in secondary schools; some were in elementary schools and colleges and universities. State and local rehabilitation agencies, Veterans Administration rehabilitation programs, and V.A. hospitals were major employers of counselors. Some worked in training and rehabilitation organizations such as Goodwill and Lighthouses for the Blind.

Counselors also worked in many types of public and private community mental health and social service agencies and organizations such as family (marriage) counseling services, halfway houses and homes for children and the handicapped, offender rehabilitation agencies, self-help organizations such as Alcoholics Anonymous and drug rehabilitation organizations, and in religious organizations providing similar services.

Training, Other Qualifications, and Advancement

Generally, a master's degree in student personnel, counseling, student personnel services, rehabilitation counseling, counseling psychology, psychology, or a related field is required. In some cases, individuals with a bachelor's degree in psychology, sociology, counseling, or rehabilitation services are qualified, particularly if they have worked in related fields, such as social work, teaching, interviewing, job placement, psychology, or personnel.

Counselor education programs at the graduate level are available in over 400 colleges and universities, usually in departments of education or psychology. One to two years of graduate study are usually required for a master's degree. Most graduate programs include supervised experience in counseling. Graduate courses include counseling theory and techniques, assessment and evaluation, individual and group counseling, occupational and educational information, and community resources. About 24 graduate counselor education programs are currently accredited by the Council for Accreditation of Counseling and Related Educational Programs.

Counselors must be skillful communicators.

Many counselors are certified. The National Board for Certified Counselors examines professional credentials and conducts a national examination for those who wish to have the designation of "National Certified Counselor."

Most States require public school counselors to have both counseling and teaching certificates. However, a growing number of States no longer require a teaching certificate. Depending on the State, a master's degree in counseling and 1 to 5 years of teaching experience may be required for a counseling certificate. State departments of education can provide specific information.

Vocational and related rehabilitation agencies generally require a master's degree in rehabilitation counseling, counseling and guidance, or counseling psychology for rehabilitation counselor jobs. Some may, however, accept applicants with a bachelor's degree in rehabilitation services, counseling, psychology, or related fields. Experience in employment counseling, job development, psychology, education, and social work may be helpful.

Approximately 30 colleges and universities offer a bachelor's degree in rehabilitation services education. In 1983, the Council on Rehabilitation Education accredited 70 graduate programs in rehabilitation counseling. Usually, 2 years of study—including a period of supervised work experience—are required for the master's degree.

Counselors in most State vocational rehabilitation agencies must score competitively on a written examination, and be evaluated by a board of examiners. Many employers require rehabilitation counselors to be certified. To become certified, counselors must meet educational and experience standards established by the Commission on Rehabilitation Counselor Certification, and pass a written examination.

Some States require counselors in public employment offices to have a master's degree; others do not. Most counselors in State employment agencies have a bachelor's degree plus additional courses in guidance and counseling.

Mental health counselors generally have a master's degree or doctorate in mental health counseling, another area of counseling, or in psychology or social work. Mental health counselors can be certified by the National Academy of Certified Clinical Mental Health Counselors. A master's degree, a period of supervised internship, and passing an examination are required for certification. In addition, a number of States require a license for private practice.

Some employers provide an initial period of training for newly hired counselors or counselor trainees. Many agencies have work-study programs whereby employed counselors can earn graduate degrees. Professional counselors must meet continuing education requirements for certification and licensure. They do this through participation in graduate studies, workshops, institutes, and personal studies.

Persons interested in counseling should have a strong interest in helping others and the ability to inspire respect, trust, and confidence. They should be able to work independently or as part of a team.

School counselors may advance by moving to a larger school; becoming director or supervisor of counseling or guidance; or, with further graduate education, becoming an educational psychologist, vocational psychologist, school psychologist, or school administrator. Usually, educational or vocational psychologists must have the Ph.D. degree.

Rehabilitation, mental health, and employment counselors may advance to supervisory or administrative jobs in their agencies. Some counselors move into research, consulting work, or college teaching, or go into private practice.

Job Outlook

Employment of counselors is expected to grow more slowly than the average for all occupations through the mid-1990's. Most job openings will result from the need to replace counselors who transfer to other fields, retire, or leave the occupation for other reasons.

Pupil enrollment is the major factor affecting employment of school counselors. Elementary school enrollments, which have been declining since the early 1970's, are projected to begin rising again after 1984. However, enrollments in secondary schools, where most school counselors work, will not start increasing again until after 1990. In some communities, declining enrollments and fiscal constraints are likely to result in staff cutbacks, with school counselors being transferred to classroom teaching, especially in States where counselors also hold teacher certification. The number of counselors in colleges and universities is expected to decline as college enrollments decrease.

Total employment in State and local government, except education—where most rehabilitation and employment counselors are employed—is expected to increase more slowly than average through the mid-1990's, and employment of counselors is expected to follow this same trend.

Employment of mental health counselors and others who work with individuals with personal and social problems such as marital or other family difficulties, alcoholism, drug abuse, and aging is likely to grow faster than average, however. Private practice, community and social service agencies, and the development of human resource and employee assistance programs in private business and industry are expected to be areas of growth.

Earnings

According to a recent survey, the average salary of school counselors in the 1982-83 academic year was $24,500. Salaries varied by size, grade level, and locality of the school. Average

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salaries ranged from about $21,000 in the Southeast to almost $28,000 in the Far West. Salaries of rehabilitation, mental health, and employment counselors are usually somewhat lower than those of school counselors.

Some counselors supplement their income by part-time consulting or other work with private or public counseling centers, government agencies, or private industry.

Related Occupations

Counselors help people evaluate their interests, abilities, and disabilities, as well as help them deal with personal, social, academic, and career problems. Others who help people in similar ways include college and student personnel workers, teachers, personnel workers and managers, social workers, psychologists, psychiatrists, members of the clergy, occupational and physical therapists, training and employee development specialists, and equal employment opportunity/affirmative action specialists.

Sources of Additional Information

For general information about counselors, contact:

American Association for Counseling and Development, 5999 Stevenson Ave., Alexandria, Va. 22304.

For information on training programs accredited by the Council for Accreditation of Counseling and Related Educational Programs, contact:

Council for Accreditation of Counseling and Related Educational Programs, American Association for Counseling and Development, 5999 Stevenson Ave., Alexandria, Va. 22304.

For information on national certificaiton requirements and procedures, contact:

National Board for Certified Counselors, 5999 Stevenson Ave., Alexandria, Va. 22304.

State departments of education can supply information on colleges and universities that offer training in guidance and counseling as well as on State certification and licensure requirements.

State employment service offices can supply information about their job opportunities and entrance requirements.

For information about rehabilitation counseling, contact:

National Rehabilitation Counseling Association, 633 So. Washington St., Alexandria, Va. 22314.

National Council on Rehabilitation Education, 1200 Commercial St., Emporia, Kans. 66801.

A list of accredited graduate programs in rehabilitation counseling may be obtained from:

Council on Rehabilitation Education, 162 North State St., Room 317, Chicago, Ill. 60601.

For a list of federally funded programs offering training in rehabilitation counseling, contact:

Division of Resource Development, Rehabilitation Services Administration, U.S. Department of Education, 330 C St. SW., Washington, D.C. 20201.

For information on certification requirements for rehabilitation counselors, contact:

Commission on Rehabilitation Counselor Certification, 162 North State St., Chicago, Ill. 60601.

For information on certification requirements for mental health counselors, contact:

National Academy of Certified Clinical Mental Health Counselors, 5999 Stevenson Ave., Alexandria, Va. 22314.

OTHER TEACHING, LIBRARY, AND COUNSELING OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Adult education teachers	Teach and instruct out-of-school youths and adults in courses other than those which lead to an occupational objective. Subjects may include such self-improvement or avocational courses as americanization, basic education, bridge, fine arts, homemaking, stock market, languages, etc. Teaching may take place in a public or private nonproprietary school whose primary business is education and training, or in a school associated with an organization whose primary business is other than education.	125,000	Faster than average
Dance instructors	Instruct pupils in ballet, ballroom, tap and other forms of dance. Observe students to determine physical and artistic qualifications. Explain and demonstrate techniques and methods of regulating movement of body and feet to musical accompaniment.	27,000	Faster than average
Extension service specialists	Instruct extension workers or develop specialized service activities in field of agriculture or home economics. Work may involve planning training programs, lecturing and preparing literature on such subjects as home management or horticulture.	14,000	More slowly than average
Vocational education teachers	Teach vocational and occupational subjects at the postsecondary level (but at less than the baccalaureate) to students who have graduated or left high school. Subjects may include business, secretarial science, data processing, commercial art, trades or practical nursing. Teaching may take place in a public or private proprietary school whose primary business is education and training, or in a school associated with an organization whose primary business is not education.	98,000	Faster than average

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Health Diagnosing and Treating Practitioners

Health practitioners diagnose, treat, and strive to prevent illness and disease. While all of them practice the art of healing, they differ in methods of treatment and areas of specialization. *Physicians*—both doctors of medicine and doctors of osteopathy—prescribe medications, exercise, proper diet, and surgery. Manipulation of muscles and bones, especially the spine, is the primary form of treatment given by *chiropractors*. *Optometrists* specialize in eye care and *podiatrists* treat foot diseases and deformities. *Dentists* emphasize not only the treatment but the prevention of problems associated with the teeth and gums. *Veterinarians* treat animals and inspect meat, poultry, and other food as part of public health programs.

Among the health practitioners whose work is described in this section of the *Handbook*, the most numerous are physicians, who held 479,000 jobs in 1982. The other practitioner occupations are much smaller, as the following tabulation shows:

Physicians (M.D.'s and D.O.'s)	479,000
Dentists	173,000
Veterinarians	36,000
Optometrists	28,000
Chiropractors	25,000
Podiatrists	13,000

Training to become a health practitioner is much more rigorous than training for most other professional occupations, but practice also offers unusual rewards. Incomes of health practitioners greatly exceed the average and generally are higher than those of other professional workers with similar years of graduate education. Furthermore, health practitioners enjoy great prestige within the community, and most derive considerable satisfaction from knowing that their work contributes directly to the well-being of others.

All health practitioners must have the ability and perseverance to complete the years of study required. They should be emotionally stable, able to make decisions in emergencies, and have a strong desire to help the sick and injured. Sincerity and an ability to gain the confidence of patients also are important qualities.

Among these six health practitioner occupations, minimum training requirements vary from 6 to 9 years of postsecondary education. After college, prospective physicians must complete 3- or 4-year programs of medical education, followed by at least 1 year of graduate training in a hospital (residency or internship). Physicians who specialize, and most M.D.'s do, spend several years in training after their residency to qualify for specialty board examinations. Two years of college are required for entry to the 4-year chiropractic schools. Optometrists, podiatrists, and veterinarians all must complete a minimum of 2 years of college before beginning the 4-year program.

Occupational licensing is a distinctive feature of the health sector. The right to practice medicine, dentistry, nursing, pharmacy, and several other professions—and the right to call oneself a physician, dentist, nurse, or pharmacist—is regulated by law. Each of the 50 States has legislation governing the kinds of tasks that may be performed by a given health professional, and specifying the training and proof of competence necessary for practice. Complementing the occupational licensure laws is a system of granting professional credentials, in which associations and other nongovernmental bodies attest to an individual's competence through certification or registration.

The employment outlook for health practitioners is expected to remain favorable through the mid-1990's, but the market is changing as supply overtakes demand. The physician shortage identified during the 1960's and early 1970's has vanished as a result of legislative measures designed to expand supply. In fact, medical school graduates are finding it unexpectedly difficult to secure the residency of their choice and—later on—to start a practice. Established practitioners report that they are seeing fewer patients than they would like.

Nonetheless, physicians in private practice generally work 60 hours a week or more and their earnings potential exceeds that in most other occupations. In the years ahead, demand for their services will continue to grow, for the population is increasing—especially the number of older people, who are relatively heavy users of health care. Moreover, rural communities and inner city neighborhoods remain underserved.

The American health care system is likely to change in a number of ways in the years ahead as a result of efforts to control the very rapid increase in health care costs. For example, practice patterns are likely to change. Solo practice is already beginning to give way to group practice and a variety of salaried arrangements, and this trend is likely to accelerate as more and more young practitioners accept salaried positions. Salaried positions for physicians are found in health maintenance organizations; multispecialty group practices; ambulatory, emergency, critical care, and subspecialty procedure facilities; the Armed Forces and the Veterans Administration; and in other institutional settings. Especially in areas already well served with practitioners, new graduates appear willing to sacrifice traditional practice patterns (and income potential) in favor of ensured earnings, regular hours, and protection from some of the more stressful elements of practice.

Changes in the employment situation of physicians cannot help but affect other health practitioners, and competition for patients is already evident. Some specialists are moving into general practice as referrals for specialty work fall off. Competition appears to be mounting between physicians, on the one hand, and other providers including optometrists, podiatrists, chiropractors, clinical psychologists, physical therapists, and nurse midwives, on the other. In dentistry, the ample supply of dentists raises questions about prospects for dental auxiliaries (hygienists and assistants). However, relations among the health occupations are complex and the net effect of an abundance of physicians and dentists is uncertain. For more detailed information about the outlook in individual practitioner occupations, see the statements that follow.

Chiropractors

(D.O.T. 079.101-010)

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 (adjustments) of parts of the body, especially the spinal column.

Because of the emphasis on the spine and its position, most chiropractors use X-rays to help locate the source of patients' difficulties. In addition to manipulation, chiropractors use water, light, massage, ultrasound, electric, and heat therapy. They also prescribe diet, supports, exercise, and rest. Most State laws specify the types of supplementary treatment permitted in chiropractic. Chiropractors do not prescribe drugs or surgery.

Working Conditions

Almost all chiropractors work in private offices that are clean and comfortable. The average workweek is about 40 hours, but this may include some evening and weekend time to accommodate patients who work. Because most chiropractors are self-employed, they can set their own hours. Like other self-employed health practitioners, chiropractors tend to be older than average when they stop working altogether.

Employment

Chiropractors held about 25,000 jobs in 1982. Most chiropractors were in private practice and

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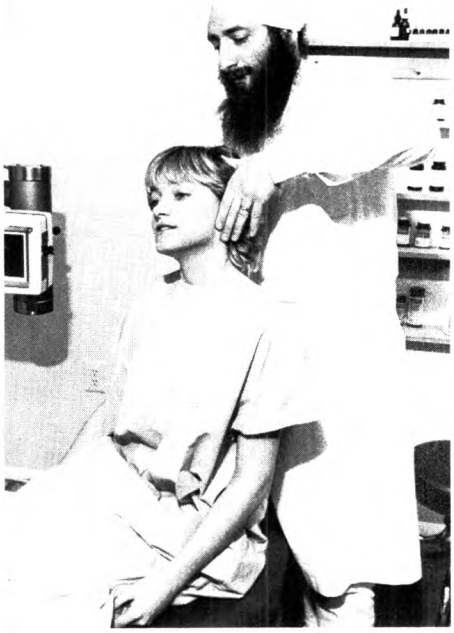

Chiropractors treat patients primarily by manual manipulation.

about 70 percent were in solo practice—that is, they had no partners. Some were salaried assistants of established practitioners or worked for chiropractic clinics. A small number taught or conducted research at chiropractic colleges.

Chiropractors often locate in small communities—about half work in cities of 50,000 inhabitants or less.

Training, Other Qualifications, and Advancement

All 50 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. Many States have reciprocity agreements that permit chiropractors already licensed in another State to obtain a license without taking an examination.

The type of practice permitted and the educational requirements for a license vary considerably from one State to another, but in general, State licensing boards require successful completion of a 4-year chiropractic course following 2 years of college. Thirty-eight State boards recognize only academic training in chiropractic colleges accredited by the Council on Chiropractic Education. Some States require specific college courses such as English, chemistry, biology, or physics. Several States require that chiropractors pass a basic science examination. The National Board of Chiropractic Examiners' test given to chiropractic students is accepted by 47 State boards in place of a State examination.

In 1982, 9 of the 15 chiropractic colleges in the United States were fully accredited by the Council on Chiropractic Education; 5 others were recognized candidates working toward accreditation. All chiropractic colleges require applicants to have a minimum of 2 years of undergraduate study, including courses in English, the social sciences, chemistry, biology, physics, and mathematics.

Chiropractic colleges emphasize courses in manipulation and spinal adjustments. Most offer a broader curriculum, however, including subjects such as physiotherapy and nutrition. During the first 2 years, most chiropractic colleges emphasize classroom and laboratory work in subjects such as anatomy, physiology, and biochemistry, while the last 2 years stress clinical experience. Students completing chiropractic training earn the degree of Doctor of Chiropractic (D.C.).

Chiropractic requires a keen sense of observation to detect physical abnormalities and considerable hand dexterity but not unusual strength or endurance. Persons desiring to become chiropractors should be able to work independently and handle responsibility. The ability to work with detail is important. Sympathy and understanding are desirable qualities for dealing effectively with patients.

Most newly licensed chiropractors either set up a new practice or purchase an established one. Because of the financial investment necessary to open and equip an office, many first work for established chiropractors to acquire the experience and the funds needed.

Job Outlook

Job opportunities for chiropractors through the mid-1990's will reflect employment growth that is expected to be about as fast as the average for all occupations plus the need to replace experienced chiropractors who leave the profession.

Demand for chiropractic is related to the ability of patients to pay for services, either directly or through health insurance, and to public acceptance of the profession, which appears to be growing. At present, newly-graduated chiropractors are entering practice with little difficulty. Enrollments in chiropractic colleges have grown dramatically, however, and as more students graduate, new chiropractors may encounter competition establishing a practice in areas where other practitioners already are located.

Earnings

In chiropractic, as in other types of independent practice, earnings are relatively low in the beginning. From the limited data available, new graduates who worked as associates to established practitioners earned more than $15,000 a year in 1982. Experienced chiropractors averaged about $45,500, after expenses, according to a survey conducted by the American Chiropractic Association.

Related Occupations

Chiropractors diagnose, treat, and work to prevent diseases, disorders, and injuries. They emphasize the importance of the nervous system for good health. Others whose professions require similar skills include acupuncturists, audiologists, dentists, naturopathic doctors, optometrists, osteopaths, podiatrists, speech pathologists, and veterinarians.

Sources of Additional Information

The board of licensing in each State capital can supply information on State licensing requirements for chiropractors.

General information on chiropractic as a career is available from:

American Chiropractic Association, 1916 Wilson Blvd., Arlington, Va. 22201.

International Chiropractors Association, 1901 L St. NW., Suite 800, Washington, D.C. 20036.

For a list of chiropractic colleges, as well as general information on chiropractic as a career, contact:

Council on Chiropractic Education, 3209 Ingersoll Ave., Des Moines, Iowa 50312.

For information on requirements for admission to a specific chiropractic college, contact the admissions office.

Dentists

(D.O.T. 072)

Nature of the Work

Dentists examine teeth and 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 and provide other preventive services.

Dentists spend most of their time with patients, but may devote some time to laboratory work such as making dentures and inlays. Most dentists, however—particularly those in large cities—send their laboratory work to commercial firms. Some dentists employ dental hygienists to clean patients' teeth and provide instruction for patient self-care. Dentists may also employ other assistants to perform office work, assist in "chairside" duties, and provide therapeutic services under their supervision. (The work of dental hygienists and dental assistants is described elsewhere in the *Handbook*.)

Most dentists are general practitioners who provide many types of dental care; about 15 percent practice in one of the eight specialty areas recognized by the American Dental Association (ADA). The largest group of specialists are orthodontists, who straighten teeth. The next largest group, oral surgeons, operate on 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 5 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.

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Working Conditions

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.

Employment

Dentists held about 173,000 jobs in 1982. Because some dentists hold more than one job, the number of jobs exceeds the number of dentists in practice—nearly 132,000, according to the U.S. Public Health Service.

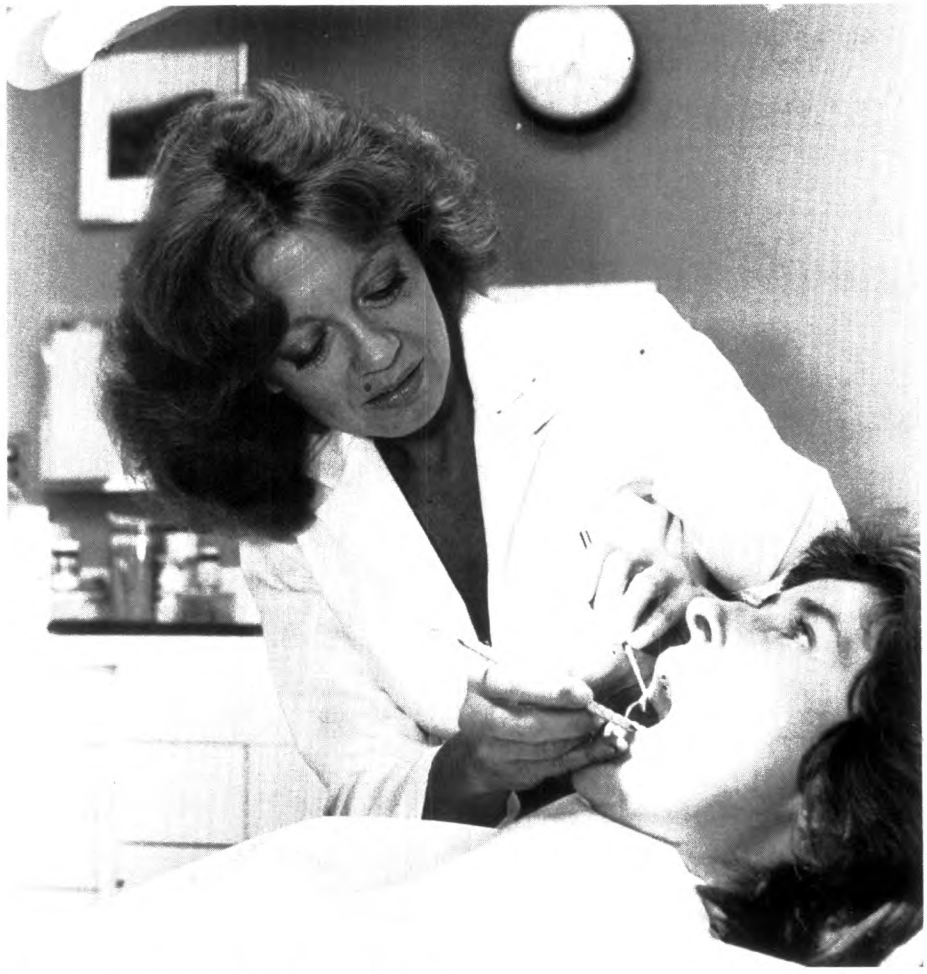
Nine out of 10 dentists are in private practice. Of the remainder, about half do research, teach or hold positions in dental schools. Some work in hospitals and clinics. About 1,000 dentists work in the hospitals and clinics of the Veterans Administration and the U.S. Public Health Service.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require dentists to be licensed. To qualify for a license in most States, a candidate must graduate from a dental school approved by the American Dental Association and pass written and practical examinations. In 1982, candidates in 49 States and the District of Columbia could fulfill part of the State licensing requirements by passing a written examination given by the National Board of Dental Examiners. Most State licenses permit dentists to engage in both general and specialized practice. In 16 States and the District of Columbia, however, a dentist must obtain a specialty license before practicing as a "specialist." Requirements include 2 or 3 years of graduate education and, in some cases, completion of a special State examination. Extra education also is necessary in the other 34 States, but the dental profession, not the State licensing authority, regulates the specialist's practice. To practice in a different State, a licensed dentist usually must pass that State's examination. However, 20 States grant licenses to dentists from other States on the basis of their credentials. Dentists who want to teach or do research usually 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 schools require a minimum of 2 to 4 years of college-level predental education. In fact, most dental students are college graduates. Four out of five of the students entering dental schools in 1982 had a bachelor's or master's degree. Predental education must include courses in the sciences and humanities.

In selecting students, dental schools give considerable weight to college grades. In addition, all dental schools participate in a nationwide 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 give preference to residents of their particular States.



Examining a patient requires manual dexterity.

Dental school generally lasts 4 academic years, although one institution condenses the program into 3 calendar years and another program lasts 5 years. Studies begin with classroom instruction and laboratory work in basic sciences including anatomy, microbiology, biochemistry, and physiology. Courses in preclinical technique and beginning courses in clinical sciences also are provided at this time. During the last 2 years the student treats patients chiefly in dental clinics.

Most dental colleges award the degree of Doctor of Dental Surgery (D.D.S). An equivalent degree, Doctor of Dental Medicine (D.M.D.), is conferred by 20 schools.

Earning a dental degree is a costly process, but financial aid is available from the Federal and State governments, health-related organizations, industry, and dental schools. Many dental students rely on student loans to finance their professional training.

Dentistry requires both manual skills and a high level of diagnostic ability. Dentists should have good visual memory, excellent judgment of space and shape, and a high degree of manual dexterity, as well as scientific ability. Good business sense, self-discipline, and the ability to instill confidence are helpful for success in private practice. High school students who want to become dentists are advised to take courses in biology, chemistry, health, and mathematics.

Most dental graduates open their own offices or purchase established practices. Some gain experience with established dentists and save money to equip an office; others may enter residency training programs in approved hospitals or dental schools. Dentists who enter the Armed Forces are commissioned as captains in the Army and Air Force and as lieutenants in the Navy. Graduates of recognized dental schools are eligible for positions in the Federal service and for commissions (equivalent to lieutenants in the Navy) in the U.S. Public Health Service.

Job Outlook

Employment of dentists is expected to grow about as fast as the average for all occupations through the mid-1990's due to population growth, increased awareness that regular dental care helps prevent and control dental diseases, and prepayment arrangements, which make it easier for people to afford dental services.

Because of the abundant supply of practitioners, however, the employment situation for dentists is becoming competitive in some areas of the country. The number of dental school graduates rose sharply from the mid-1960's until the mid-1970's, as new dental schools were established. The expansion has moderated since then, and first-year enrollments have declined since 1980. (See chart.) Nevertheless, a substantial number of newly qualified dentists will enter the labor market each year.

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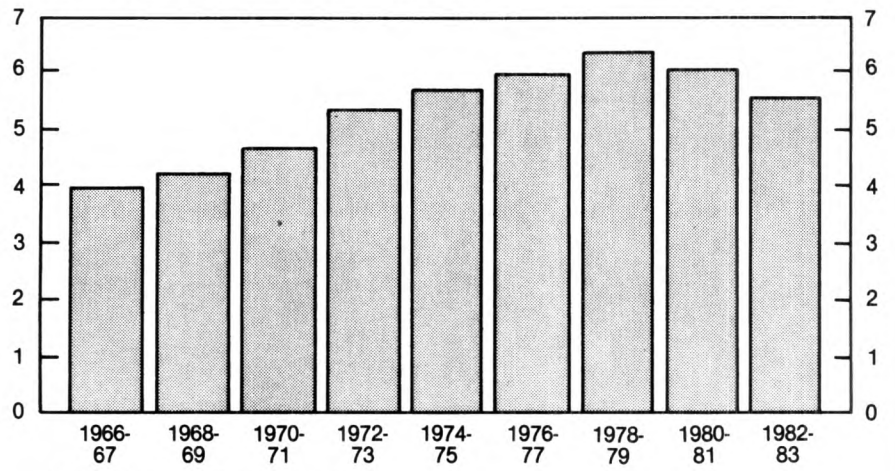
Even though the upsurge in dental school enrollments has halted, the outlook in dentistry remains competitive.



As a result, an oversupply of dentists may develop in some localities and intensify in others. If so, various market adjustments are likely—increased evening and weekend office hours (although total hours may be reduced), reductions in earnings, and less intensive use of dental assistants and dental hygienists, for example. To build clientele, dentists are likely to experiment with new ways of providing care and may, for example, reach out to hitherto underserved groups such as the elderly.

Fluoridation of community water supplies and improved dental hygiene prevent tooth and gum disorders and preserve teeth that might otherwise be extracted. However, since the preserved teeth may need care in the future, these measures may increase rather than decrease the demand for dental care. There will continue to be a need for dentists to teach in dental colleges, administer dental public health programs, and serve in the Armed Forces.

In a departure from the usual pattern, replacement needs create relatively few job openings. This reflects the fact that dentists have a distinctive employment pattern: Once having completed their training and entered dental practice, they tend to work continuously until they reach retirement age. Some older dentists reduce their hours of work because of ill health or desire for leisure, but very few people leave dentistry to take up other careers. A comparable degree of occupational attachment is found in only a few other occupations, notably among other health practitioners, who, like dentists, have a considerable investment in training.

Earnings

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 1982 was about $55,000 a year, according to the limited information available. In the Federal Government, new graduates of dental schools could expect to start at $24,500 a year in 1982. Experienced dentists working for the Federal Government in 1982 averaged $46,000; some earned as much as $57,500.

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 can become known easily and where they may face less competition from established practitioners. Although income 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.

Except for emergencies, dental work generally can be postponed. During periods of high unemployment and economic hardship, therefore, dentists tend to experience a reduction in the volume of work and lower earnings.

Related Occupations

Dentists examine, diagnose, and treat various oral diseases and abnormalities. Others whose work involves personal contact and requires a long and rigorous period of scientific training include psychologists, optometrists, physicians, veterinarians, and podiatrists.

Sources of Additional Information

For information on dentistry as a career and a list of accredited dental schools, contact:

American Dental Association, Council on Dental Education, 211 E. Chicago Ave., Chicago, Ill. 60611.

American Association of Dental Schools, 1619 Massachusetts Ave. NW., Washington, D.C. 20036.

The American Dental Association also will furnish a list of State boards of dental examiners. Persons interested in practicing dentistry should obtain the requirements for licensure from the board of dental examiners of the State where they plan to work.

Prospective dental students should contact the office of student financial aid at the schools to which they apply for information on scholarships, grants, and loans, including Federal financial aid.

Optometrists

(D.O.T. 079.101-018)

Nature of the Work

Half the people in the United States wear glasses or contact lenses. Optometrists (doctors of optometry) provide most of the vision care these people need. They examine people's eyes to diagnose vision problems and detect signs of disease and other abnormal conditions. They also test to insure that the patient has proper depth and color perception and the ability to focus and coordinate the eyes. When necessary, they prescribe lenses and treatment. Where evidence of disease is present, the optometrist refers the patient to the appropriate health care practitioner. Most optometrists supply the prescribed eyeglasses and fit and adjust contact lenses. Optometrists also prescribe vision therapy or other treatment which does not require surgery. In 37 States optometrists may utilize diagnostic drugs; in three of these States they may also utilize drugs to treat eye diseases.

Although most optometrists are in general practice, some specialize in work with the elderly or with children. Others work with partially sighted persons, who use microscopic or telescopic lenses. Still others concentrate on contact lenses or vision therapy. Optometrists teach, do research, consult, and serve on health advisory committees of various kinds.

Optometrists should not be confused with either ophthalmologists or dispensing opticians. Ophthalmologists are physicians (doctors of medicine or osteopathy) who specialize in medical eye care, 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 statements on physicians and dispensing opticians elsewhere in the *Handbook*.)

Working Conditions

Optometrists work in places—usually their own offices—that are clean, well lighted, and comfortable. The work requires a lot of attention to detail. Because optometrists, like other health practitioners, generally are self-employed, they have considerable flexibility in setting their hours of work, and often continue to practice after the normal retirement age. Many independent practitioners work well over 40 hours a week, including time on Saturday and in the evening.

Employment

Optometrists held about 28,000 jobs in 1982. The number of jobs is greater than the number

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Optometrists use sophisticated instruments to examine patients' eyes.

of practicing optometrists because some optometrists hold two jobs or maintain two offices. For example, an optometrist may have a full-time private practice and also work part time in a vision-care center. More than 9 out of 10 optometrists worked full time. Although the majority of optometrists are in solo practice, a growing number are in partnership or group practices. The trend toward partnership or group practices, which is especially pronounced among younger optometrists, is associated with the high cost of setting up a solo practice. For the same reason, some optometrists work as salaried employees in the offices of other optometrists.

Some optometrists work in health centers and eye clinics or teach in schools of optometry. Others work for the Veterans Administration, health maintenance organizations, public and private health agencies, and insurance companies.

Some optometrists in private practice also act as consultants to industrial safety programs, insurance companies, manufacturers of ophthalmic products, and others.

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 or college and pass a State board examination. In some States, applicants can substitute the examination of the National Board of Examiners in Optometry, given in the second, third, and fourth years of optometric school, for part or all of the written State examination. Some States allow applicants to be licensed without lengthy examination if they have a license in another State. In 46 States, optometrists must earn continuing education credits in optometry to renew their licenses.

The Doctor of Optometry degree requires a minimum of 6 or 7 years of higher education consisting of a 4-year professional degree program preceded by at least 2 or 3 years of preoptometric study at an accredited university, college, or junior college. Most optometry students enter with at least a bachelor's degree. In 1982, there were 13 schools and colleges of optometry in the United States accredited by the Council on Optometric Education of the American Optometric Association; accreditation was pending for 3 other schools. 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. All applicants must take the Optometry College Admissions Test (OCAT). Competition is keen for admission to optometry schools. Therefore, superior grades in preoptometric college courses may enhance one's chances for acceptance.

Because most optometrists are self-employed, business ability, self-discipline, and the ability to deal with patients tactfully are necessary for success.

Many beginning optometrists enter into associate practice with an optometrist or other health professional. Others purchase an established practice or set up a new practice. Some take salaried positions to obtain experience and the necessary funds to start their own practice.

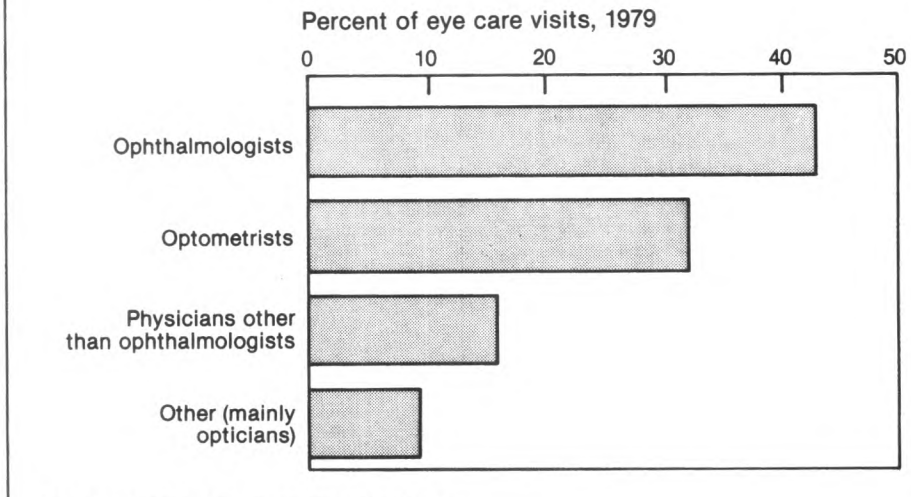
Optometrists wishing to advance in a specialized field may study for a master's or Ph.D. degree in visual science, physiological optics, neurophysiology, public health, health administration, health information and communication, or health education. One-year graduate clinical residency programs also are available in optometric specialties including family practice optometry, pediatric optometry, geriatric optometry, low vision rehabilitation, vision training, contact lenses, hospital-based optometry, and primary care optometry. Optometrists who enter the Armed Forces as career officers have the opportunity to work toward advanced degrees and to do research on vision problems.

Job Outlook

Opportunities for optometrists through the mid-1990's will reflect employment growth that is about average for all occupations, plus the need to replace experienced optometrists who leave the profession.

Replacement needs arise almost entirely from retirements and deaths, for optometrists,

Optometrists account for about a third of patient visits for eye care.



SOURCE: National Center for Health Statistics

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like other health practitioners, have a strong attachment to their profession and generally remain in practice until they stop working altogether. Few transfer to other occupations. Because over a third of all active optometrists are 55 years of age or older, it is expected that a large number of optometrists will retire during the next decade.

Population growth and the aging of the population are major factors contributing to anticipated growth in the occupation, although a shift in optometrists' share of the vision care market could also affect demand. Visits to both optometrists and ophthalmologists are substantially higher for persons over the age of 45, reflecting the onset of vision problems during middle age and the increasing severity of these problems in old age. Rising per capita income, which permits people to pay for more frequent doctor visits, and greater recognition of the importance of good vision also should increase demand for optometric services.

Health insurance coverage of optometric services is growing. Today, 30 million Americans are covered under some sort of vision benefit program. Broadening of health insurance coverage to provide reimbursement for eye care provided by optometrists is likely to bring about a shift in current patterns of service utilization, and a greater number of optometric visits. (Most plans already pay for vision care provided by ophthalmologists and other physicians.) If consumers change their preference for the type of provider, the relative positions of optometrists and ophthalmologists in the vision care market could change. Currently, optometrists account for about one-third of patient visits for eye care, as the accompanying chart shows.

Earnings

In 1982, net earnings of new optometry graduates in their first full year of practice averaged about $24,000. Experienced optometrists averaged about $50,000 annually. Optometrists working for the Federal Government earned an average of $34,800 a year in 1982. Incomes vary greatly, depending upon location, specialization, and other factors. Optometrists who start out by working on a salaried basis tend to earn more money initially than optometrists who set up their own solo practice. However, in the long run, those with their own private practice have the potential to earn more than those employed by other optometrists, hospitals, health agencies, retail stores, or other firms.

Related Occupations

Other occupations in which the main activity consists of applying logical thinking and scientific knowledge to prevent, diagnose, and treat disease, disorders, or injuries in humans or animals are chiropractors, dentists, osteopathic physicians, physicians, podiatrists, and veterinarians.

Sources of Additional Information

For information on optometry as a career, write to:

American Optometric Association, Education and Manpower Division, 243 North Lindbergh Blvd., St. Louis, Mo. 63141.

Additional career information and a listing of accredited optometric educational institutions as well as required preoptometry courses can be obtained from:

Association of Schools and Colleges of Optometry, Suite 410, 600 Maryland Ave. SW., Washington, D.C. 20024.

The Board of Optometry in the capital of each State can supply information on licensing requirements.

For information on admission requirements and sources of financial aid, including Federal loans and scholarships, contact individual optometry schools.

Physicians

(D.O.T. 070 and 071)

Nature of the Work

Physicians perform medical examinations, diagnose illnesses, and treat people who are suffering from injury or disease. They also advise patients on maintaining good health. There are two types of physicians: the M.D.—Doctor of Medicine—and the D.O.—Doctor of Osteopathy. Despite differences in training and philosophy of treatment, both M.D.'s and D.O.'s use all accepted methods of treatment, including drugs and surgery. Osteopathic physicians, however, place special emphasis on the musculo-skeletal system of the body—bones, muscles, ligaments, and nerves. One of the basic treatments or therapies used by osteopathic physicians centers on manipulating this system with the hands.

Physicians may be "family doctors" who engage in general practice or they may specialize in a particular field of medicine. Most D.O.'s are general practitioners, providing primary care; only about 11 percent are specialists. On the other hand, about 85 percent of the M.D.'s who provide patient care are specialists. (See chart). The largest of the medical specialties for which there is postgraduate training are internal medicine, general surgery, obstetrics and gynecology, psychiatry, pediatrics, radiology, anesthesiology, ophthalmology, pathology, and orthopedic surgery. The most rapidly growing specialties are in the primary care area—family practice, internal medicine, and pediatrics.

Some physicians combine the practice of medicine with research or teaching in medical schools.

Working Conditions

Many physicians have long, irregular hours. Most specialists work fewer hours each week than general practitioners. As doctors approach retirement age, they may accept fewer new patients and tend to work shorter hours. However, many continue in practice well beyond 70 years of age.

Employment

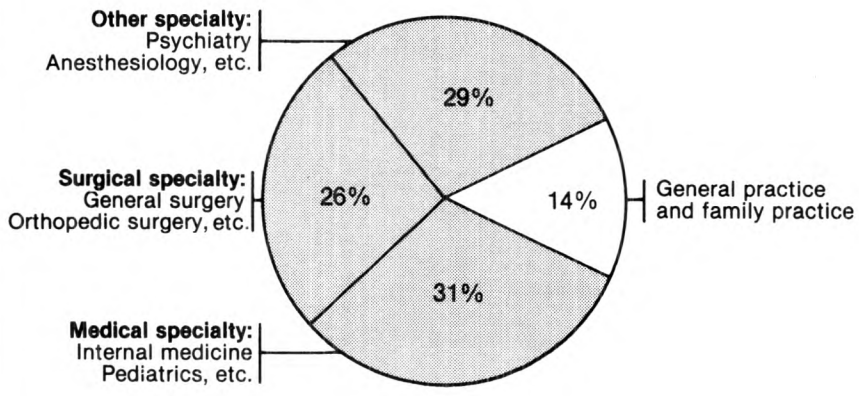
Physicians held about 479,000 jobs in 1982. Because young physicians in particular frequently "moonlight," the number of jobs exceeds the number of individuals who are in practice—about 430,000 M.D.'s and 20,000 D.O.'s in 1982, according to the American Medical Association and the American Osteopathic Association.

About two-thirds of the M.D.'s had office practices; about one-fourth worked as residents or full-time staff members in hospitals. The remaining M.D.'s taught or had primarily administrative or research duties.

The Northeast has the highest ratio of physicians to population; the South, the lowest.

Specialists outnumber general practitioners by 6 to 1.

Percent of physicians by specialty group, 1981



SOURCE: American Medical Association

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More than half of all D.O.'s practice in cities and towns of fewer than 50,000 inhabitants. M.D.'s, on the other hand, have tended to locate in urban areas, close to hospital and educational centers, so many rural areas have been underserved. Currently, more medical students are being exposed to practice in rural communities with the direct support of educational centers and hospitals in more populous areas. In addition, some rural areas offer physicians guaranteed minimum incomes to offset the relatively low earnings typical in rural medical practice.

Osteopathic physicians are located chiefly in those States that have osteopathic hospitals. In 1982, three-fifths of all D.O.'s were in Florida, Michigan, Pennsylvania, New Jersey, Ohio, Texas, and Missouri. Nineteen States and the District of Columbia each had fewer than 50 osteopathic physicians in 1982.

Training and Other Qualifications

All States, the District of Columbia, and Puerto Rico require physicians to be licensed. Licensure requirements for both D.O.'s and M.D.'s include a minimum of 8 years of postsecondary education—graduation from an accredited professional school, successful completion of a licensing examination, and, in most States, 1 or 2 years of supervised practice in an accredited graduate medical education program (internship/residency). The licensing examination taken by most graduates of U.S. medical schools is the National Board of Medical Examiners (NBME) test that all States except Texas and Louisiana accept.

Graduates of foreign medical schools generally begin practice in the United States after completing a U.S. hospital residency training program. To enter an approved residency, graduates of foreign medical schools usually must pass an examination administered by the Educational Commission for Foreign Medical Graduates and be certified by that organization. After one year of work in an approved residency, foreign medical graduates, as well as graduates of U.S. medical schools who have not taken the NBME test, must take the Federation Licensure Examination (FLEX) that all jurisdictions accept. Although physicians licensed in one State usually can get a license to practice in another without further examination, some States limit reciprocity.

Of the 127 accredited schools in the United States in which students can begin study for the M.D. degree, 126 award the degree of Doctor of Medicine (M.D.). One school offers a 2-year program in the basic medical sciences to students who transfer to another medical school for the last semesters of study. Fifteen schools of osteopathic medicine award the degree of Doctor of Osteopathic Medicine (D.O.).

The minimum educational requirement for entry to a medical or osteopathic school is normally 3 years of college; some schools require 4 years. A few medical schools allow exceptional students to begin their professional study after 2 years of college. Most students have at least a bachelor's degree, and many have advanced degrees.

Required premedical study includes undergraduate work in English, physics, biology, and inorganic and organic chemistry. Students also should take courses in the humanities, mathematics, and the social sciences to acquire a broad general education. Studies have shown that medical students with undergraduate majors in the humanities do as well in their medical studies as those who major in the sciences or a "premedical curriculum."

Medicine is a popular field of study, and applicants must compete for entry with highly motivated students who generally have excelled in preprofessional education. Factors considered by the schools in admitting students include their academic record and their scores on the Medical College Admission Test, which almost all applicants take. Consideration also is given to the applicant's character, personality, and leadership qualities, as shown by personal interviews, letters of recommendation, and extracurricular activities. Osteopathic colleges give considerable weight to a favorable recommendation by an osteopathic physican familiar with the applicant's background. Many State-supported schools give preference to State residents and, sometimes, to residents of nearby States.

Students spend the first semesters of medical school primarily in laboratories and classrooms learning basic medical sciences such as anatomy, biochemistry, physiology, pharmacology, microbiology, and pathology. Additionally, students gain some clinical experience with patients during the first 2 years of study, learning to take case histories, perform examinations, and recognize symptoms. During the last semesters, students work under supervision in hospitals and clinics to gain experience in the diagnosis and treatment of illness.

After graduation, almost all M.D.'s complete 1 or 2 years of graduate medical education (residency). Nearly all D.O.'s serve a 12-month rotating internship (including experience in surgery, pediatrics, internal medicine, and other specialties.) Physicians seeking certification in a specialty spend from 2 to 5 years—depending on the specialty—in advanced residency training, followed by 2 or more years of practice in the specialty. Then they must pass the specialty board examinations. Physicians who want to teach or do research may take graduate work leading to a master's or Ph.D. degree in a field such as biochemistry or microbiology.

A physician's training is very costly. However, loans and scholarships are available from the Federal Government, State and local governments, and private sources. To receive this aid,the student may have to demonstrate

A career in medicine requires years of rigorous and very costly training.

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financial need or agree to serve at least 3 years in the Armed Forces upon graduation.

Persons who wish to become physicians must have a strong desire to serve the sick and injured. They must be self-motivated and competitive to survive the pressures of premedical and medical education and the demanding workload during the internship/residency that follows medical school. They must study a great deal to keep up with the latest advances in medical science. Sincerity and a pleasant personality are helpful in gaining the confidence of patients. Physicians should be emotionally stable and able to make decisions in emergencies.

In view of the variation in State laws, students interested in becoming physicians should study carefully the professional and legal requirements of the State in which they plan to practice. Those who have completed 1 year of graduate medical education and enter active military duty initially serve as captains in the Army or Air Force or as lieutenants in the Navy. Graduates also qualify for professional medical positions in the Federal civil service.

Job Outlook

Job opportunities for physicians through the mid-1990's will reflect faster-than-average employment growth plus the need to replace experienced physicians who leave the medical profession.

Population growth and aging contribute to the need for more physicians. Especially rapid growth is projected for the elderly population, which makes much greater use of physicians' services than younger persons. Demand for medical care is greatly influenced by ability to pay, and access to physicians' services is widespread as a result of broad health insurance coverage—through private insurance, now a standard employee benefit, as well as through public programs including Medicare and Medicaid. In addition, more physicians will be needed for medical research and for the growing fields of public health, rehabilitation, industrial medicine, and mental health.

Replacement needs in medicine and osteopathic medicine account for fewer job openings than in most other occupations, because physicians exhibit very strong attachment to their work. Once having completed training and entered medical practice, physicians tend to remain in the labor force until they retire. Moreover, relatively few leave medicine for other careers.

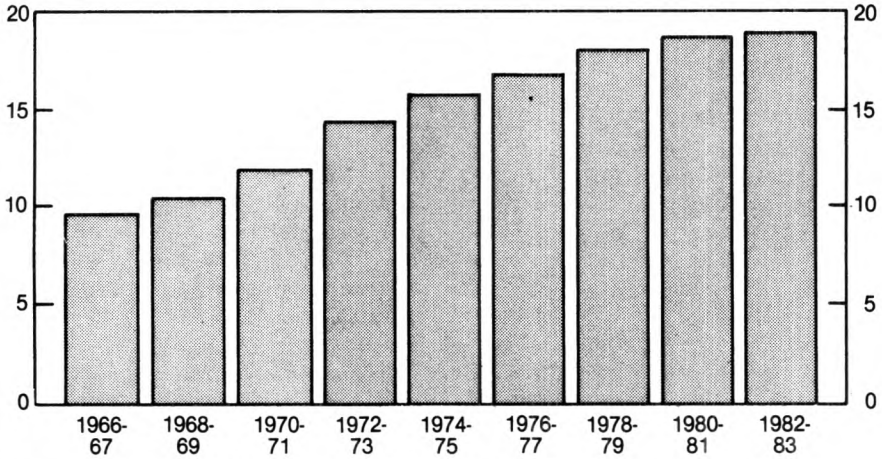
Supply and demand are projected to be roughly in balance through the mid-1990's. However, the increasingly abundant supply of practitioners will create problems for some individuals and lead to surpuses in some localities. Medical school enrollments have increased greatly since the mid-1960's; the sharpest rise occurred between 1965 and 1975. While enrollment increases have moderated since the mid-1970's and little change is forseen after the mid-1980's, the number of people completing training each year will be relatively large. (See chart.)

Foreign-trained physicians (including U.S. citizens who completed their training abroad) currently account for approximately one-sixth of all newly licensed physicians and one-fifth of all M.D.'s in practice. The Bureau of Health Professions anticipates the supply of foreign-trained physicians to grow more slowly through the mid-1990's than in the past. Of new physicians who enter practice each year through 1995, approximately 1 in 10 will be a foreign medical graduate.

Competition for post-graduate residencies will intensify since the number of first year residency positions will closely match the number of graduates from U.S. medical schools. Newly trained physicians are likely to experience competition as they seek to launch a practice. Those who are willing to locate in inner cities, rural areas, and other places where doctors are not in oversupply should have little difficulty.

Intensified competition due to substantial growth in the supply of newly qualified M.D.'s and D.O.'s is certain to affect physicians' earnings. It also will limit their choice of practice location and specialty. Because of greater competition for patients and changes currently underway in the organization and financing of the Nation's health care, more physicians may choose salaried positions. Fewer will go into solo practice. Pressure to curtail the influx of foreign medical graduates is likely to continue.

Dramatic growth in the number of medical students has contributed to the increasingly competitive outlook for physicians.



SOURCE: Association of American Medical Colleges; American Osteopathic Association

Earnings

Stipends of medical school graduates serving as residents in hospitals vary according to the type of residency, geographic area, and size of the hospital, but allowances of $19,000 to $22,000 a year are common. Many hospitals also provide full or partial room and board and other maintenance allowances to residents.

Graduates who had completed approved 3-year residencies but had no other medical experience received a starting salary at Veterans' Administration hospitals of about $46,800 a year in 1983. In addition, those working full time received up to $13,000 in other cash benefits or "special" payments.

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 practices develop.

Physicians have among the highest average annual earnings of any occupational group. According to information from the American Medical Association, physicians in family or general practice and pediatricians averaged just over $70,000 in 1982. Anesthesiologists' radiologists', and surgeons' average income were slightly more than $130,000. The average of all physicians' net incomes for 1982 was about $100,000. Earnings of physicians depend on factors such as the region of the country; patients' income; and the physician's skill, personality, professional reputation, and experience. Self-employed physicians usually earn more than those in salaried positions.

Related Occupations

Physicians work to prevent, diagnose, and treat diseases, disorders, and injuries. Other occupations that require similar kinds of skill and critical judgment include audiologists, chiropractors, dentists, optometrists, podiatrists, speech pathologists, and veterinarians.

Sources of Additional Information

For a list of approved medical schools, as well as general information on premedical education, financial aid, and medicine as a career, contact:

Office of Related Health Professions, American Medical Association, 535 N. Dearborn St., Chicago Ill. 60610.

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Association of American Medical Colleges, Suite 200, One Dupont Circle NW., Washington, D.C. 20036.

For general information on osteopathic medicine as a career, contact:

American Osteopathic Association, Department of Public Relations, 212 East Ohio St., Chicago, Ill. 60611.

American Association of Colleges of Osteopathic Medicine, 4720 Montgomery Lane, Bethesda, Md. 20814.

Information on Federal scholarships and loans is available from the directors of student financial aid at schools of medicine and osteopathic medicine. Information about Armed Forces Health Professions Scholarships is available from any local military recruiting office.

Persons who wish to practice medicine or osteopathic medicine in a particular State should inquire about licensure requirements directly from the board of examiners of that State.

Podiatrists

(D.O.T. 079.101-022)

Nature of the Work

Because we use them so often in walking, running, or just standing, we are constantly and painfully aware when our feet hurt. A growing number of foot sufferers visit a doctor of podiatric medicine, or podiatrist, for relief. Podiatrists diagnose and treat diseases and disorders of the foot. 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. Podiatrists treat a variety of foot conditions, including corns, bunions, calluses, ingrown toenails, skin and nail diseases, deformed toes, and arch disabilities. Whenever podiatrists find symptoms of a medical disorder affecting other parts of the body—arthritis, diabetes, or heart disease, for example—they refer the patient to a physician while continuing to treat the foot problem.

Podiatrists diagnose and treat foot problems.

More than 4 of every 5 podiatrists are generalists who provide all types of food care. However, some podiatrists specialize in foot surgery, orthopedics (bone, muscle, and joint disorders), podopediatrics (children's foot ailments), or podogeriatrics (foot problems of the elderly). Regular vigorous exercise contributes to physical health and emotional well-being, and with the growing popularity of jogging, tennis, racquetball, and other fast-moving sports, the specialty of sports medicine is showing rapid growth.

Working Conditions

Podiatrists usually work independently in their own offices. They generally work 40 hours a week, and they set their hours to suit their practice.

Employment

Podiatrists held about 13,000 jobs in 1982. While the majority of podiatrists are in private practice, some are employed by other podiatrists. Other podiatrists are employed by hospitals, health maintenance organizations, and podiatric medical colleges. The Veterans Administration and public health departments also employ some podiatrists.

Podiatrists work mainly in large cities.

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 college of podiatric medicine and pass a written and oral examination. Eight States—Arizona, California, Georgia, Michigan, New Jersey, Oklahoma, Rhode Island, and Virginia—require applicants to serve a 1-year residency in a hospital or clinic following graduation. Most of the States grant licenses without further examination to podiatrists already licensed by another State.

The six colleges of podiatric medicine are located in California, Illinois, Iowa, New York, Pennsylvania, and Ohio. Minimum entrance requirements at these schools include 3 years of undergraduate college work with courses in English, chemistry, biology or zoology, physics, and mathematics. However, most entrants surpass the minimum requirements. About 90 percent of the class entering in 1982 held at least a bachelor's degree, and the average enrollee had an overall grade point average of "B" or better. All colleges of podiatric medicine require applicants to earn an acceptable score on the Medical College Admissions Test.

Of the 4 years in podiatry school, the first 2 are spent in classroom instruction and laboratory work in anatomy, bacteriology, chemistry, pathology, physiology, pharmacology, and other basic sciences. During the final 2 years, students gain clinical experience while continuing their academic studies. The degree of Doctor of Podiatric Medicine (D.P.M.) is awarded to graduates. Additional education and experience generally are necessary to practice in a specialty. Federal, State, and private loans are available for students to pursue full-time study leading to a degree in podiatric medicine.

Persons planning a career in podiatry should have scientific aptitude and manual dexterity, and like detailed work. A good business sense and congeniality also are assets as in any medical profession.

Most newly licensed podiatrists set up their own practices. Some purchase established practices, or take salaried positions to gain the experience and money they need to begin their own practices.

Job Outlook

Employment of podiatrists is expected to grow much faster than the average for all occupations through the mid-1990's as podiatry continues to gain recognition as a health profession, causing more people to turn to podiatrists for foot care. Health insurance is not a barrier, for public and private programs generally cover podiatry services. Broader participation in fast-moving sports that tend to aggravate foot disorders will spur demand, as will the growing number of older people, many of whom have foot problems.

In addition to opportunities created by rapid growth in employment, many openings will result from the need to replace podiatrists who retire or stop working for other reasons. Opportunities for graduates to establish new practices, as well as to enter salaried positions, should be favorable.

Earnings

Newly licensed podiatrists build their practices over a number of years. Income during the first several years is usually low but generally rises significantly as the practice grows. From the limited information available, a net income of about $70,000 a year is common for established podiatrists. Newly licensed podiatrists hired by Veterans Administration hospitals earned starting salaries between $24,508 and $29,374 in early 1983.

Related Occupations

Podiatrists work to prevent, diagnose, and treat diseases, disorders, and injuries. Other occupations that require similar skills include audiologists, chiropractors, dentists, optometrists, osteopathic physicians, physicians, speech pathologists, and veterinarians.

Sources of Additional Information

Information on license requirements in a particular State is available from that State's board of examiners.

Information on colleges of podiatric medicine, entrance requirements, curriculums, and student financial aid is available from:

American Association of Colleges of Podiatric Medicine, 20 Chevy Chase Circle NW., Washington, D.C. 20015.

For additional information on podiatry as a career, contact:

American Podiatry Association, 20 Chevy Chase Circle NW., Washington, D.C. 20015.

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For information about financial assistance programs administered by the U.S. Department of Health and Human Services, write to:

Division of Student Assistance, Health Resources and Services Administration, 5600 Fishers Lane, Rockville, Md. 20857.

Veterinarians

(D.O.T. 073. except .361-010)

Nature of the Work

Think of a veterinary doctor and you will likely imagine someone caring for pandas and elephants at the zoo or treating the family poodle for a case of "kennel cough." But some vets work with scientific research teams on such projects as searching out new pharmaceuticals to treat heart disease. They help prevent the outbreak and spread of animal diseases, some of which—like rabies—can be transmitted to human beings. Veterinarians perform surgery on sick and injured animals and prescribe and administer medicines and vaccines.

Over one-third of all veterinarians treat small animals or pets exclusively. Another one-third treat both large and small animals. Almost 10 percent specialize in the health and breeding of cattle, poultry, sheep, swine, or horses. The remainder are in a variety of practice specialties. Some veterinarians inspect food, investigate disease outbreaks, or work in laboratories as part of Federal and State public health programs. Others teach in veterinary colleges, work in zoos or animal laboratories, or engage in medical research.

Working Conditions

Veterinarians usually treat pet animals in hospitals and clinics. Those who specialize in large animal practice usually work out of well equipped mobile clinics and drive considerable distances between farms and ranches to care for their animal patients. Veterinarians are sometimes exposed to injury, disease, and infection. Those in private practice often work long hours. Veterinarians in rural areas may work outdoors in all kinds of weather. Because they are self-employed, veterinarians in private practice usually can continue working well beyond normal retirement age.

Employment

Veterinarians held about 36,000 jobs in 1982. Most were in private practice. The Federal Government employed about 2,300 veterinarians in civilian jobs, chiefly in the U.S. Department of Agriculture and the U.S. Public Health Service. Other employers of veterinarians are State and local governments, international health agencies, colleges of veterinary medicine, medical schools, research laboratories, livestock farms, animal food companies, and pharmaceutical companies.

Veterinarians are located in all parts of the country, and the type of practice generally varies according to geographic setting. Veterinarians in rural areas mainly 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

All States and the District of Columbia require veterinarians to have a license. To obtain a license, applicants must have a Doctor of Veterinary Medicine (D.V.M. or V.M.D.) degree from an accredited college of veterinary medicine and pass written and—in most States—oral State board proficiency examinations. Some States issue licenses without further examination to veterinarians already licensed by another State.

For veterinarians seeking positions in research and teaching, an additional master's or Ph.D. degree usually is required or, increasingly, specialty board certification in a field such as pathology, physiology, toxicology, or laboratory animal medicine. Veterinarians who seek specialty board certification must complete an approved residency program, pass the board's examination, and meet any other board requirements.

The D.V.M. or V.M.D. degree requires a minimum of 6 years of college consisting of a 4-year professional degree program preceded by at least 2 years of preveterinary study that emphasizes the physical and biological sciences. Several veterinary medical colleges require 3 years of preveterinary work, and most successful applicants have completed 4 years of college. In addition to rigorous academic instruction, professional training includes considerable practical experience in diagnosing and treating animal diseases, performing surgery, and performing laboratory work in anatomy, biochemistry, and other scientific and medical subjects.

In 1983, 25 colleges of veterinary medicine in the United States were accredited by the Council on Education of the American Veterinary Medical Association (AVMA). Admission to these schools is highly competitive. Each year there are many more qualified applicants than the schools can accept. Serious applicants usually need grades of "B" or better, especially in science courses. Experience in part-time or summer jobs working with animals is advantageous. Colleges usually give preference to residents of the State in which the college is located, because these schools are largely State supported. In the South and West, regional educational plans permit cooperating States without veterinary schools to send students to designated regional schools. In other areas, colleges that accept out-of-State students give priority to applicants from nearby States that do not have veterinary schools.

The Federal Government provides some loans for students in schools of veterinary medicine, subject to the availability of funds; service

Recent graduates often start out by working in an established veterinary practice.

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in an underserved area after graduation may cancel the student's obligation.

Most veterinarians begin as employees or partners in established practices. Those who can afford the substantial investment needed for drugs, instruments, and other startup costs may set up their own practices. An even greater investment is needed to open an animal hospital or purchase an established practice.

Newly trained veterinarians may qualify for civilian jobs with the U.S. Government as meat and poultry inspectors, disease-control workers, epidemiologists, research assistants, or commissioned officers in the U.S. Public Health Service. A license is not required for Federal employment.

Job Outlook

Employment of veterinarians is expected to grow faster than the average for all occupations through the mid-1990's, primarily because of growth in the companion animal (horses, dogs, and other pets) population. Emphasis on scientific methods of raising and breeding livestock and poultry, and growth in public health and disease control programs also will stimulate the demand for veterinarians. In addition, many new veterinarians will be needed each year to replace those who retire or die.

Despite rapid growth in employment, newly qualified veterinarians may face competition in establishing a practice in some areas due to the increasingly abundant supply of practitioners. Veterinary school enrollments rose sharply in the 1970's, and the number of graduates is expected to remain at current levels for the foreseeable future. The expense of establishing a practice has prompted more and more graduates to seek employment with established veterinarians until they can finance their own practices. If this trend continues, competition for salaried positions with existing veterinary practices will grow.

Opportunities are presently excellent for those in some specialties such as food animal practice, toxicology, and pathology, and demand for specialists is expected to remain strong.

Earnings

According to limited data from the AVMA, the average net income for private practice veterinarians was about $45,000 in 1983; incomes vary considerably, depending on factors such as location, type of practice, and years of experience.

Newly graduated veterinarians employed by the Federal Government started at $22,956 a year in 1982. The average annual salary of veterinarians in the Federal Government was $37,000 in 1982.

Related Occupations

Veterinarians use their professional training to prevent, diagnose, and treat diseases, disorders, and injuries. Others who require similar skills are audiologists, chiropractors, dentists, optometrists, physicians, podiatrists, and speech pathologists.

Sources of Additional Information

A pamphlet entitled *Today's Veterinarian* presents information on veterinary medicine as a career and lists accredited 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, 930 N. Meacham Rd., Schaumburg, Ill. 60196.

Information on opportunities for veterinarians in the U.S. Department of Agriculture is available from:

Animal and Plant Health Inspection Service, Field Service Office, Employment Services, Butler Square West, 5th Floor, 100 N. 6th St., Minneapolis, Minn. 55043.

Food Safety and Quality Service, Personnel Division, Butler Square West, 4th Floor, 100 N. 6th St., Minneapolis, Minn. 55043.

For information on scholarships, grants, and loans, contact the financial aid officer at the veterinary schools to which you wish to apply.

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Registered Nurses, Pharmacists, Dietitians, Therapists, and Physician Assistants

The health professionals described in this section of the *Handbook* care for the sick, help the disabled, and advise individuals and communities on ways of maintaining and improving their health. Nursing is by far the largest of these occupations. Registered nurses held more than 1.3 million jobs in 1982. The other occupations described here vary in size from pharmacists (about 151,000 jobs) to physician assistants (22,000 jobs).

Registered nurses are an essential part of the health team. They work primarily in hospitals, where they provide direct patient care, assist in surgery and diagnostic procedures, train and supervise other members of the staff, organize health education activities for patients and the community, and handle administrative tasks. A growing number work in long-term care facilities such as nursing homes, rehabilitation centers, and mental hospitals. Some engage in community health, industrial, or school nursing, while others work in clinics or physicians' offices or do private duty nursing. With additional training and experience, registered nurses may assume the responsibilities of *nurse practitioners*, *nurse midwives*, or *nurse anesthetists*. In these expanded roles, nurses perform tasks that otherwise would be performed by a physician.

Three principal kinds of nursing education programs—diploma, associate degree, and bachelor's degree—prepare students for careers as registered nurses. The differences should be understood by the prospective nursing student. However, all nursing education programs share the goals of teaching nurses the scientific basis of modern nursing practice, familiarizing them with the latest treatment and rehabilitation techniques, and equipping them to understand patients' medical, social, and psychological needs.

The relatively new occupation of *physician assistant* (PA) involves direct patient care by workers who are trained to perform many of the more routine tasks normally carried out by a physician. These include taking medical histories, doing routine examinations, and making hospital rounds. Physician assistants work under a physician, usually right in the office. Some, however, practice in rural health clinics, prisons, and other places where physicians are not readily available. Training commonly lasts 2 years. Admission to PA training is highly competitive, and most students already have a background in one of the health professions. Legal provisions permitting physician assistants to practice are not uniform throughout the country, in part because the occupation is so new.

Therapists use a variety of techniques to help patients who are injured, disabled, or emotionally disturbed to regain physical or emotional independence. *Physical therapists* use exercise and other treatments to help patients increase strength, mobility, and coordination. *Occupational therapists* teach skills of everyday living, including vocational skills, to people who are disabled or handicapped. Their goal is to help patients adapt to their limitations and learn to be as self-sufficient as possible. *Speech pathologists and audiologists* work with children and adults who have speech, language, or hearing impairments. *Rehabilitation counselors*, whose work is closely related to that of therapists, are discussed in the *Handbook* statement on vocational and education counselors.

A number of other therapists aid in rehabilitation. *Orientation therapists for the blind* help newly blinded persons learn to move about unassisted; to handle such everyday activities as dressing, grooming, eating, and using the telephone; and to communicate by means of Braille, reading machines, or other devices. *Recreation therapists*, also known as *therapeutic recreation workers*, are trained to use sports, games, crafts, and hobbies as part of the rehabilitation of ill, disabled, or handicapped persons. (See the statement on recreation workers elsewhere in the *Handbook*.) *Art, dance,* and *music therapists* help patients resolve physical, emotional, or social problems through nonverbal means of communication. *Horticultural therapists* use gardening for therapeutic purposes—as a group activity for persons with mental or emotional problems, for example. A bachelor's degree with a health professions specialization is standard preparation for most therapy occupations. For some jobs, a master's degree is essential.

Dietitians and *pharmacists* also use special skills and expertise to assist sick or disabled persons, although they do not provide direct patient care. Having completed college programs that include bacteriology, chemistry, and other sciences, these workers draw on scientific knowledge to devise therapeutic treatments or give advice on the effects of diet or drugs. Both fields offer opportunities to practice in a variety of settings. Dietitians plan diets to meet the nutritional needs of groups as diverse as hospital patients, school children, prisoners, and hotel guests. Pharmacists generally work in hospitals or community pharmacies where they dispense drugs and medicines prescribed by health practitioners. Like other health professionals, dietitians and pharmacists sometimes teach or do consulting work in addition to their primary job.

Pharmacists, physical therapists, and registered nurses must have a license to practice. Students considering one of these careers should investigate the licensing requirements in the State where they plan to work. Complementing the occupational licensure laws is a system of voluntary credentialing, in which professional associations and other nongovernmental bodies attest to an individual's competence through certification or registration.

Employment in these occupations is expected to grow faster than the average for all occupations through the mid-1990's. Population growth, especially the increase in the number of older people, will spur demand for health care. Since the number of persons age 75 and over is projected to rise very rapidly in the years ahead, the need for a broad range of health and social support services for older persons will escalate. However, the availability of public and private funds to pay for health care will continue to determine which services are actually in place.

Health insurance terms that prescribe which services are reimbursable affect both the industry and occupational "mix" of health sector employment. Increased coverage for hospice services, for example, would stimulate demand for nurses, social workers, and pastoral counselors in hospices, although volunteers provide most hospice care. Similarly, measures to encourage greater use of nurse practitioners, nurse midwives, and physician assistants would spur employment in those occupations.

Currently, a broad-based effort to contain the rate of increase in health care costs is underway. Although the results of various cost containment strategies are difficult to predict, it is clear that redesign of the financing system could mean sweeping changes in the organization and delivery of health care in the United States. This could alter the rate of employment growth and cause some occupations to diverge from current projections. In addition to new jobs created by future growth, many openings will occur due to replacement needs.

Several other sections of the *Handbook* contain statements on health careers. Check the alphabetical index at the back to locate the statements on health services administrators, dental assistants, medical assistants, nursing aides, orderlies, and attendants, dispensing opticians and ophthalmic laboratory technicians, and dental laboratory technicians.

Books and brochures on health careers are available in libraries, counseling centers, and

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bookstores. The Sources of Additional Information section at the end of each *Handbook* statement identifies organizations that can provide pamphlets, lists of accredited schools, and sources of financial aid. For an overview of jobs in the health field, including some jobs not covered in *Handbook*, request a copy of "200 Ways to a Health Career" from:

National Health Council, 1740 Broadway, New York, N.Y. 10019.

Another useful publication is the *Health Careers Guidebook*, fourth edition, published in 1979 by the U.S. Department of Labor and the U.S. Department of Health, Education, and Welfare (now the Department of Health and Human Services). It is available for $7.50 from:

Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Dietitians

(D.O.T. 077 except .121-010)

Nature of the Work

Nutrition is the science of food and its effect on the body. It is concerned with the nutrients in food, their use in body chemistry, and—in the final analysis—the relationship between diet and health. Dietitians provide nutritional counseling to individuals and groups; set up and supervise food service systems for institutions such as hospitals and schools; and promote sound eating habits through education and research. In this field, the term "nutritionist" applies to a number of different health professionals involved with food science and human nutrition. Among these are dietitians, food technologists, and home economists.

Among dietitians, major areas of specialization include administration, education, research, and clinical and community dietetics.

Administrative dietitians apply the principles of nutrition and sound management to large-scale meal planning and preparation, such as that done in hospitals, prisons, company cafeterias, 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 dietetic departments also decide on departmental policy; coordinate dietetic services with the activities of other departments; and are responsible for the dietetic department budget, which in large organizations may amount to millions of dollars annually.

Clinical dietitians, sometimes called therapeutic dietitians, assess nutritional needs, develop and implement nutrition care plans, and evaluate and report the results in hospitals, nursing homes, or clinics. Clinical dietitians confer with doctors and other members of the health care team about patients' nutritional care, instruct patients and their families on the requirements and importance of their diets, and suggest ways to maintain these diets after leaving the hospital or clinic. In a small institution, a dietitian may perform both administrative and clinical duties.

Community dietitians or *nutritionists* may counsel individuals and groups on sound nutrition practices to prevent disease, maintain health, and rehabilitate persons recovering from illness. They may engage in teaching and research with a community health focus. This work covers areas such as special diets, meal planning and preparation, and food budgeting and purchasing. Dietitians or nutritionists in this field usually are associated with community health programs; they may be responsible for planning, developing, coordinating, and administering a nutrition program or a nutrition component within the community health program. They work mainly for public and private health and social service agencies, including "meals-on-wheels" programs, congregate meals for older Americans, and nutritional programs for women with infants and young children.

Research dietitians seek ways to improve the nutrition of both healthy and sick people. They may study nutrition science and education, food management, food service systems and equipment, or how the body uses food. Other research projects may investigate the nutritional needs of the aging, persons who have chronic diseases, or space travelers. Research dietitians need advanced training in this field and usually are employed in medical centers or educational facilities, or they may work in community health programs.

Working Conditions

Although most dietitians work 40 hours a week, dietitians in hospitals may sometimes work on weekends, and those in commercial food services have somewhat irregular hours. Dietitians spend much of their time in clean, well-lighted, and well-ventilated areas, such as research laboratories, classrooms, or offices near food preparation areas. However, they do spend time in kitchens and serving areas that often are hot and steamy. Dietitians working in hospital and clinical settings may have to be on their feet a lot; those involved in consulting spend a significant amount of time traveling.

Employment

Dietitians held about 44,000 jobs in 1982. Health care facilities, including hospitals, nursing homes, and clinics, are major employers of dietitians, accounting for nearly 60 percent of the jobs in 1982. Colleges, universities, and school systems provide approximately 10 percent of all jobs, and another 10 percent are in child care or residential care facilities. Other jobs are found in a variety of settings, including prison systems, hotel and restaurant chains, and business firms that provide food service for their employees.

Many dietitians work as consultants, either full time or part time. In addition to serving on the staff of a hospital, for example, a dietitian may be a consultant for another health care facility. Nursing homes use consultants to provide much of their dietitic supervision.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in foods and nutrition or institution management is the basic educational requirement for dietitians. This degree can be earned in about 240 colleges and universities, usually in departments of home

Health care facilities are major employers of dietitians.

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economics and food and nutrition sciences. Required college courses include food and nutrition, institution management, chemistry, bacteriology, and physiology. Other important courses are mathematics, statistics, computer science, psychology, sociology, and economics. It is also possible to prepare for this profession by receiving an advanced degree in nutrition, food service management, or related sciences and providing evidence of qualifying work experience.

To qualify for professional credentials as a Registered Dietitian (R.D.), the American Dietetic Association (ADA) recommends completion of an approved dietetic internship or a coordinated undergraduate program or 3 years of approved qualified experience plus a bachelor's degree or 6 months of approved qualified experience plus an advanced degree. The internship lasts 6 to 12 months and combines clinical experience under a qualified dietitian with some classroom work. In 1982, 100 internship programs were accredited by the ADA. A growing number of coordinated undergraduate programs have been developed that enable students to complete their clinical experience requirement while obtaining their bachelor's degree. In 1982, 67 such programs were offered by medical schools and by departments of allied health and home economics in colleges and universities. These programs are accredited by the ADA.

Experienced dietitians may advance to assistant or associate director or director of a dietetic department. Advancement to higher level positions in teaching and research requires graduate education; public health nutritionists usually must earn a graduate degree. Graduate study in institutional or business administration is valuable to those interested in administrative dietetics. Many dietitians have acquired advanced degrees in related areas.

Persons who plan to become dietitians should have organizational and administrative ability as well as scientific aptitude, and should be able to work well with people. Among the courses recommended for high school students interested in careers as dietitians are home economics, business administration, biology, health, mathematics, and chemistry.

Job Outlook

Employment of dietitians is expected to grow faster than the average for all occupations through the mid-1990's to meet the expanding needs of hospitals and long-term care facilities. Most job openings, however, will result from the need to replace experienced dietitians who stop working or transfer to other occupations. A growing number of experienced dietitians are moving into management positions in private industry, for example.

The factors that underlie future growth in demand for health services—population growth and aging, emphasis on health education and promotion of prudent lifestyles, and widespread ability to pay for care through public and private health insurance—also will spur demand for dietitians. In addition, dietitians will be needed in other settings, such as catering firms and restaurant chains. Dietitians also will be needed to staff community health programs and to conduct research in food and nutrition.

Staffing flexibility can be facilitated by using full-time and part-time dietitians. For this reason, opportunities for part-time employment should remain favorable.

To help meet the demand for dietetic services, nursing homes are using (under the supervision of registered dietitians) dietetic assistants trained in vocational-technical schools and dietetic technicians trained in ADA-approved programs in community colleges. Employment opportunities should continue to be favorable for graduates of these programs.

Earnings

Entry level salaries of hospital dietitians averaged $17,880 a year in 1982, according to a national survey conducted by the University of Texas Medical Branch. Some experienced hospital dietitians received as much as $41,832 a year.

The starting salary in the Federal Government for those with a bachelor's degree was about $13,369 in 1982. The average Federal salary for dietitians was about $24,781 in 1982.

Dietitians usually receive benefits such as paid vacations, sick leave, holidays, health insurance, and retirement benefits.

Related Occupations

Dietitians apply the principles of nutrition in a variety of situations. Other workers with similar duties include food and home economists, executive chefs, and food service managers.

Sources of Additional Information

For information on accredited dietetic internship and coordinated undergraduate programs, scholarships, registration, and a list of colleges providing training for a professional career in dietetics, contact:

The American Dietetic Association, 430 North Michigan Ave., Chicago, Ill. 60611.

The U.S. Office of Personnel Management, Washington, D.C. 20415, has information on hiring requirements for dietitians in Federal hospitals and for public health nutritionists and dietitians in the U.S. Public Health Service.

Occupational Therapists

(D.O.T. 076.121-010)

Nature of the Work

Occupational therapists provide services to people who are mentally, physically, or emotionally disabled. By providing specific activities and adaptive equipment, occupational therapists help these people learn skills to live independent, productive, and satisfying lives. These activities are designed to prepare patients to return to work, develop or restore basic functions, and aid in adjustment to disabilities.

Like other health professionals, occupational therapists usually work as a member of a medical team, which may include a physician, physical therapist, clinical psychologist, rehabilitation counselor, social worker, and others. Team members evaluate the patient in terms of their individual specialties and consult with each other to arrive at an overall evaluation of the patient's capacities, skills, and abilities. Together they develop short- and long-term goals and the means by which they may be achieved.

Various activities are used as therapy tools. When working with children, occupational therapists use toys and games to teach a variety of skills. With other patients, occupational therapists use activities of daily living skills, such as meal preparation, bathing, and dressing in clinic areas set up as kitchens and bathrooms. Woodworking, leatherwork, or other therapeutic activities may increase motor skills, strength, endurance, concentration, and motivation.

Often the loss of function causes the inability to care for oneself. Occupational therapists provide adaptive equipment such as wheelchairs, splints, and aids for eating and dressing. They may design and make special equipment for disabled patients and recommend changes in the home or work environment to facilitate functioning. In the treatment of individuals with emotional problems, occupational therapists provide individual and group activities to help people learn self-care and to manage their work and leisure more efficiently. These activities may include crafts that require planning and time management skills, budgeting, shopping, meal preparation and homemaking, self-care, and using community resources such as public transportation and service agencies.

Although they are not necessarily expert in all these activities, occupational therapists must know enough about them to understand their therapeutic values and to set them into motion.

Occupational therapists tend to work with certain disability and age groups. For instance, approximately 3 out of 5 occupational therapists work principally with persons who have physical disabilities; the rest work with patients who have psychological or emotional problems or developmental deficits. Some work only with children and young adults; others work exclusively with the elderly.

Besides working with patients, occupational therapists supervise student therapists, occupational therapy assistants, volunteers, and auxiliary nursing workers. The chief occupational therapist in a hospital may teach medical and nursing students the principles of occupational therapy. Many therapists supervise occupational therapy departments, coordinate patient activities, or are consultants to public health departments and mental health agencies. Some teach in colleges and universities.

Working Conditions

Although occupational therapists generally work a standard 40-hour week, they may occasionally have to work evenings or weekends. Their work environment varies according to the

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setting and available facilities. In a large rehabilitation center, for example, the therapist may work in a spacious room equipped with machines, handtools, and other devices that often generate noise. In a nursing home, the therapist may work in a kitchen when using food preparation as therapy. In a hospital, therapists may work directly on the ward with patients. Wherever they work and whatever equipment they use, they generally have adequate lighting and ventilation. The job can be physically tiring because therapists are on their feet much of the time.

Employment

Occupational therapists held about 25,000 jobs in 1982. The largest number of jobs were in hospitals, including rehabilitation and psychiatric hospitals. (See chart.) Employment of occupational therapists in school systems rose sharply in response to requirements established by the Education for All Handicapped Children Act of 1975. Today, a substantial number of therapists work in school systems and schools for handicapped children. Other major employers include nursing homes, home health agencies, community mental health centers, adult day care programs, outpatient clinics, and residential care facilities.

A growing number of occupational therapists are in private practice. They see patients in their own offices, in patients' homes, or in hospitals, nursing homes, adult day care programs, and other institutions that purchase occupational therapy services on a contract basis.

Many work part time.

Job prospects are excellent in occupational therapy.

Training, Other Qualifications, and Advancement

Preparation for this field requires a bachelor's degree in occupational therapy. Twenty-one States and the District of Columbia require a license to practice occupational therapy. Applicants for licensure must have a degree or certificate from an accredited educational program, successfully complete 6 months of supervised field work and pass the State licensure examination.

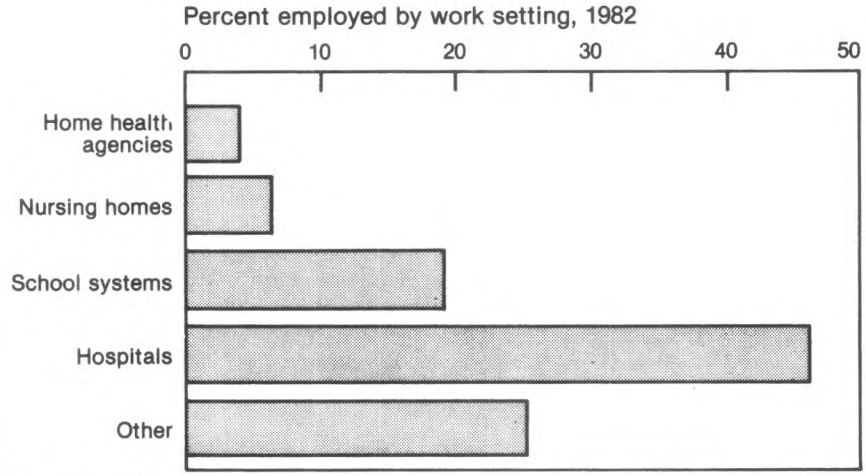
Certification is available by examination through the American Occupational Therapy Association, which awards the title of registered occupational therapist (OTR) to qualified applicants.

In 1982, accredited programs in occupational therapy were offered by 56 colleges and universities. Fifty-four of these schools offer a bachelor's degree program; some have a 2-year program for students who have completed the first 2 years of college. A number of schools offer a certificate or master's degree in occupational therapy for students who have a bachelor's degree in another field. A graduate degree often is required for teaching, research, or administrative positions.

Coursework in occupational therapy programs includes physical, biological, and behavioral sciences and the application of occupational therapy theory and skills. These programs also require students to work for 6 to 9 months in hospitals, health agencies, or schools to gain experience in clinical practice.

Entry to educational programs is highly competitive and applicants are screened carefully. Persons considering this profession should have above-average academic performance and grades of "B" or better in biology, chemistry, and other high school science courses. In addition to biology and chemistry, high school students interested in a career as an occupational therapist are advised to take courses in health, art, and the social sciences. In choosing among applicants, many educational programs weigh heavily any previous job experience in a health care setting. College students who consider transferring from another academic discipline to an occupational therapy program in their sophomore or junior year need superior grades

Occupational therapists practice in a variety of settings.



NOTE: Excludes teachers
SOURCE: American Occupational Therapy Association

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because competition for entrance to programs is more intense after the freshman year.

Persons considering this career must be able to work with people of all kinds and all ages, with temperaments and personalities that are likely to be as varied as patient illnesses and handicaps. To gain patients' confidence, it is necessary to have a warm, friendly personality that inspires both trust and respect. In addition to these qualities, it is also necessary to have ingenuity and imagination in adapting activities to individual needs. The potential therapist also needs to be skilled, patient, and resourceful in teaching, since patients often present unusual and difficult learning problems.

Newly graduated occupational therapists generally begin as staff therapists. Advancement is chiefly to supervisory or administrative positions; some therapists pursue advanced education to teach and/or conduct research.

Job Outlook

Employment in this occupation is expected to increase much faster than the average for all occupations through the mid-1990's due to anticipated rapid growth in rehabilitation programs. The number of people who will need rehabilitation services will rise sharply. Substantial growth is expected for the population age 75 and above, an age group that suffers a relatively high incidence of disabling conditions. Furthermore, advances in medical technology will save young lives that only a few years ago would have been lost: Children with severe birth defects, for example, and accident victims—many of whom are teenagers and young adults. Medical advances such as these heighten the need for rehabilitative care.

As existing programs expand and new ones are established, therapists will be needed to staff hospital rehabilitation departments, nursing homes and other long-term care facilities, clinics, psychiatric hospitals, programs in schools for children with developmental and learning disabilities, and home health programs.

Job prospects in occupational therapy are expected to be excellent through the mid-1990's. Enrollments in occupational therapy programs have leveled off, and barring a sudden shift in enrollment patterns, the number of graduates is projected to fall short of job openings due to employment growth and replacement needs.

Earnings

Beginning salaries for occupational therapists in hospitals averaged about $17,500 a year in 1982, according to a national survey conducted by the University of Texas Medical Branch. Most experienced occupational therapists earned between $19,500 and $23,700; some administrators earned as much as $34,000.

In 1982, starting salaries for therapists employed by the Federal Government, most of whom worked for the Veterans Administration, were about $15,000 a year. The average salary paid occupational therapists with the Federal Government was about $23,300 in 1982.

Related Occupations

Occupational therapists use specialized knowledge to help patients return to their normal activities and generally aid them to achieve maximum independence. Other workers performing similar duties include orthotists, prosthetists, physical therapists, speech pathologists and audiologists, rehabilitation counselors, therapeutic recreation workers, art therapists, music therapists, and dance therapists.

Sources of Additional Information

For more information on occupational therapy as a career, and for certification requirements, write to:

American Occupational Therapy Association, 1383 Piccard Dr., Rockville, Md. 20850.

Pharmacists

(D.O.T. 074.161-010)

Nature of the Work

Pharmacists dispense drugs and medicines prescribed by doctors and dentists. They also supply information and advise people on the use of prescription medicines and medicines that can be obtained without prescriptions. Pharmacists must understand the use, composition, and effect of drugs and how they are tested for purity and strength. They may maintain patient medication profiles and advise physicians on the proper selection and use of medicines. Compounding—the actual mixing of ingredients to form powders, tablets, capsules, ointments, and solutions—is now only a small part of a pharmacist's practice, since most medicines are produced by manufacturers in the dosage and form used by the patient.

Pharmacists employed in community pharmacies may 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, practice in prescription pharmacies that dispense only medicines, medical supplies, and health accessories. Increasingly community pharmacists also give advice about and sell home health care products.

Pharmacists in hospitals and clinics dispense inpatient and outpatient 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. In addition, pharmacists work as consultants to the medical team in matters related to daily patient care in hospitals, nursing homes, and other health care facilities.

Working Conditions

Pharmacists usually work in a clean, well-lighted, and well-ventilated area that resembles a small laboratory. Shelves are lined with hundreds of different drug products. In addition, some items are refrigerated and all controlled substances (narcotics, depressants, and stimulants) are kept under lock and key. Many pharmacists use computers to assist in the filing and recording of prescriptions. Pharmacists spend a lot of time on their feet.

Employment

Pharmacists held about 151,000 jobs in 1982.

Between 20 and 25 percent of all pharmacists own their own businesses; the others hold salaried positions. As the accompanying chart shows, most pharmacists work in community pharmacies—independently-owned or part of a chain. The rest work for hospitals, pharmaceutical manufacturers, wholesalers, and government and educational institutions. Pharmacy services in nursing homes generally are provided on a consultant or contract basis rather than by staff pharmacists.

Pharmacists employed by the Federal Government work chiefly in hospitals and clinics of the Veterans Administration and the U.S. Public Health Service. Other Federal agencies that employ pharmacists—for their drug knowledge, as well as to dispense drugs—include the Department of Defense, the Food and Drug Administration and other branches of the Department of Health and Human Services, and the Drug Enforcement Administration. State and local health agencies and pharmaceutical and other professional associations also employ pharmacists.

Some pharmacists hold more than one job. They may work a standard week in their primary work setting and work several hours a week in a secondary setting, as a consultant to a nursing home or clinic, for example. Pharmacy also offers opportunities for part-time employment. Community as well as hospital pharmacies often remain open in the evenings and on weekends, and all States require a licensed pharmacist to be in attendance during pharmacy hours. Self-employed pharmacists usually work more hours per week than those in salaried positions because of the additional responsibility of managing a business.

Most towns have at least one pharmacy with one pharmacist or more in attendance. Most pharmacists, however, practice in or near cities and in those States that have the largest populations.

Training, Other Qualifications, and Advancement

A license to practice pharmacy is required in all States, the District of Columbia, and Puerto Rico. To obtain a license, one must graduate from an accredited pharmacy program (a few States allow graduation from foreign pharmacy programs), pass a State board examination, and—in all States—have a specified amount of practical experience or serve an internship under the supervision of a licensed pharmacist. Internships generally are served in a community or hospital pharmacy. In 1982, all States except California, Florida, and Hawaii granted a license without reexamination to qualified pharmacists already licensed by another State. Many pharmacists are licensed to practice in more than one State.

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Pharmacists must pay close attention when filling prescriptions.

At least 5 years of study beyond high school are required to graduate from programs accredited by the American Council on Pharmaceutical Education in the 72 colleges of pharmacy. Five years are needed to obtain a Bachelor of Science (B.S.) or a Bachelor of Pharmacy (B.Pharm.) degree, the degrees received by most graduates. Depending on a student's educational background, 6 or 7 years are required for a Doctor of Pharmacy (Pharm.D.) degree. Most pharmacy schools offer the baccalaureate degree, and almost one-half also offer the professional doctorate degree; five schools offer only the latter. The Pharm.D. degree as well as the B.S. and B.Pharm. degrees may serve as the entry degree for licensure as a pharmacist.

Admission requirements vary. A few colleges admit students directly from high school. Most colleges of pharmacy, however, require entrants to have completed 1 or 2 years of prepharmacy education in an accredited junior college, college, or university. A prepharmacy curriculum usually emphasizes mathematics and basic sciences, such as chemistry, biology, and physics, but also includes courses in the humanities, social sciences, and business administration. Because entry requirements vary among colleges of pharmacy, prepharmacy students should acquaint themselves with the requirements of the school they wish to attend.

The bachelor's degree in pharmacy is the minimum educational qualification for most positions in the profession. An increasing number of students are enrolled in advanced professional programs leading to the Pharm.D. degree. A master's or Ph.D. degree in pharmacy or a related field usually is required for research work, and a Pharm.D., master's, or Ph.D. usually is necessary for administrative work or college teaching. Although a number of pharmacy graduates interested in further training pursue an advanced degree in pharmacy, there are other options. Some enter medical, dental, or law school, and others pursue graduate degrees in related disciplines.

Areas of special study include pharmaceutics and pharmaceutical chemistry (physical and chemical properties of drugs and dosage forms), pharmacology (effects of drugs on the body), pharmacognosy (drugs derived from plant or animal sources), hospital pharmacy, clinical pharmacy, and pharmacy administration. Clinical pharmacy is the synthesis of basic and pharmaceutical science education and the application of this knowledge to drug management problems in the care of patients. Courses in pharmacy administration are particularly helpful to pharmacists who become executives or managers.

All colleges of pharmacy offer courses in pharmacy practice, designed to teach students the skills involved in compounding and dispensing prescriptions, and to strengthen their understanding of professional ethics and responsibilities. In many cases, professional training increasingly emphasizes direct patient care as well as consultative services to other health professionals.

Drug manufacturers, chain drugstores, corporations, State and national pharmacy associations, colleges of pharmacy, and other organizations award scholarships annually to students studying full time toward a degree in pharmacy.

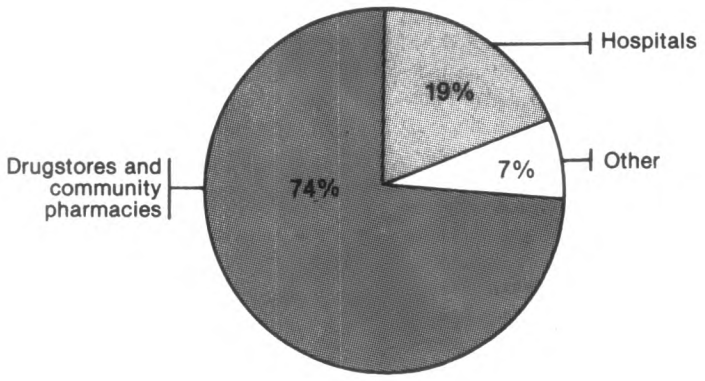
Many pharmacists are self-employed. Prospective pharmacists interested in this type of practice should have business sense and the ability to gain the confidence of clients. Honesty, integrity, orderliness, and accuracy are important attributes.

Pharmacists often begin as employees in community pharmacies. After they gain experience and secure the necessary capital, they may become owners or part owners of pharmacies. A pharmacist with experience in a chain drugstore may advance to a managerial position, 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. Pharmacists in industry often have opportunities for advancement in management, sales, research, quality control, advertising, production, packaging, and other areas.

Some individuals put their pharmaceutical training to work in related fields. For example, pharmacists are hired as sales or medical service representatives by drug manufacturers and wholesalers. They sell medicines to community pharmacies and to hospitals and inform health personnel about new drugs. Some teach in colleges of pharmacy, supervise the manufacture of pharmaceuticals, or are involved in

Although most pharmacists work in drugstores, 1 in 5 works in a hospital.

Percent employed by work setting, 1981



SOURCE: National Association of Boards of Pharmacy

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research and the development of new medicines. Pharmacists also edit or write technical articles for pharmaceutical journals. Some combine pharmaceutical and legal training in jobs as patent lawyers or consultants on pharmaceutical and drug laws.

Job Outlook

Employment of pharmacists is expected to grow about as fast as the average for all occupations through the mid-1990's, and the overall job outlook is favorable. However, in some localities, particularly large metropolitan areas, there appear to be imbalances leading to intensified competition, a situation that may continue.

As in most other occupations, the majority of job openings will result from the need to replace pharmacists who leave the profession. In pharmacy, this generally means retirement, for pharmacists, like physicians and dentists, tend to remain in the field until they retire. Relatively few transfer to other lines of work.

Demand for pharmacists will be stimulated by population growth and the aging of the population, which will cause pharmacies to open or expand in regions experiencing growth and in places where concentrations of older people are developing. Employment of pharmacists is expected to rise more rapidly in hospitals than in community pharmacies. The projected increase in the elderly population is especially important, for the number of prescriptions influences demand for pharmacists, and the elderly are relatively heavy users of medicine and drugs.

Other factors likely to spur demand for pharmacists through the mid-1990's include scientific advances that have made a wider range of drug products available for preventive and therapeutic uses and the widespread availability of health insurance, which generally pays for prescription drugs.

Earnings

Salaries of pharmacists are generally influenced by the location, size, and type of employer, as well as the duties and responsibilities of the position. Median annual earnings of full-time, salaried pharmacists were about $24,100 in 1982; the middle 50 percent earned between $19,100 and $28,300. Ten percent earned less than $14,100 and 10 percent more than $31,100.

According to a survey by *Drug Topics* magazine, pharmacists working in chain drugstores in 1982 had an average base salary of $27,651 per year, while pharmacists working in independent drugstores averaged $25,275. In general, the highest salaries were paid on the West Coast.

The average starting salary for pharmacists working in hospitals, medical schools, and medical centers was about $22,800 a year in 1982, according to a national survey conducted by the University of Texas Medical Branch; experienced pharmacists in these workplaces averaged about $29,700 a year. Pharmacists who do consulting work in addition to their primary job may have total earnings considerably higher than this. Experienced pharmacists, particularly owners or managers of pharmacies, often earn considerably more.

The minimum entrance salary in the Federal Government for a new graduate with a bachelor's degree from an approved pharmacy degree program was about $16,600 a year in 1982. However, most graduates qualified for a beginning salary of about $20,300 a year; those with 2 years of graduate work, about $24,500 a year. Pharmacists with additional years of experience may start at a higher salary. The average salary for all federally employed pharmacists was about $27,100 in 1982.

According to a survey conducted by the American Association of Colleges of Pharmacy, average annual salaries of full-time personnel in colleges of pharmacy during 1982 were as follows: Deans, about $57,000; assistant and associate deans, about $44,000; full professors, around $44,200; associate professors, around $35,000; and assistant professors, about $28,300.

With the proliferation of chain drugstores and the increasing difficulty of owning a pharmacy, some pharmacists have joined unions. The main unions organizing pharmacists are the United Food and Commercial Workers International Union and District 1199, an affiliate of the Retail, Wholesale and Department Store Union.

Related Occupations

Pharmacists fill the prescriptions of physicians, dentists, and other health practitioners and are responsible for selecting, compounding, dispensing, and preserving drugs and medicines. Workers in other professions requiring similar educational training and who work with pharmaceutical compounds or perform related duties include pharmaceutical bacteriologists, pharmaceutical chemists, and pharmacologists.

Sources of Additional Information

Additional information on pharmacy as a career, preprofessional and professional requirements, programs offered by colleges of pharmacy, and student financial aid is available from:

American Association of Colleges of Pharmacy, 4630 Montgomery Ave., Suite 201, Bethesda, Md. 20814.

General information on pharmacy is available from:

American Pharmaceutical Association, 2215 Constitution Ave. NW., Washington, D.C. 20037.

General information on independent retail pharmacies is available from:

National Association of Retail Druggists, 205 Daingerfield Road, Alexandria, Va. 22314.

For a list of accredited colleges of pharmacy, contact:

American Council on Pharmaceutical Education, 311 West Superior St., Chicago, Ill. 60610.

Information on requirements for licensure in a particular State is available from the Board of Pharmacy of the State or from:

National Association of Boards of Pharmacy, One East Wacker Dr., Suite 2210, Chicago, Ill. 60601.

Information on college entrance requirements, curriculums, and financial aid is available from the dean of any college of pharmacy.

Physical Therapists

(D.O.T. 076.121-014)

Nature of the Work

Physical therapists plan and administer treatment in order to restore bodily functions, relieve pain, and prevent or limit permanent disability to those suffering from a disabling injury or disease. Their patients include accident victims, handicapped children, and stroke victims. Physical therapy also is used in the treatment of multiple sclerosis, cerebral palsy, nerve injuries, amputations, fractures, and arthritis.

Initially, physical therapists review and evaluate the patient's condition and medical records, perform tests or measurements, and interpret the findings. Then they develop a treatment plan in cooperation with the patient's physician. The goal is to help patients attain maximum muscle strength and motor skills but, at the same time, accept and adjust to the limiting effects of their disabilities. Patients often are suffering emotional as well as physical stress, and treatment requires sensitivity in addition to technical proficiency on the part of the therapist.

Since treatments may be prolonged, the full cooperation of the patient is very important. As a first step, therefore, physical therapists familiarize themselves with patients' personal backgrounds, as well as with their medical histories, and make an effort to gain their trust and confidence. The therapist-patient relationship can be highly important in determining the effectiveness of the treatment.

Therapeutic procedures include exercise for increasing strength, endurance, coordination, and range of motion; electrical stimulation to activate paralyzed muscles; instruction in carrying out everyday activities and in the use of helping devices; and the application of massage, heat, cold, light, water, or electricity to relieve pain or improve the condition of muscles and skin. To carry out these procedures, therapists must have detailed knowledge of human anatomy and physiology and know what steps may be taken to correct disease and injury.

Treatment can be more effective and progress faster if patients and their families understand the purpose and plan and know just how they can help. Physical therapy services include instructing patients and their families in how to carry on prescribed treatment programs at home. They may need specific instruction in the techniques of muscle contraction and relaxation or in the care and use of braces or prosthetic appliances. Physical therapists may personally conduct the treatment program or supervise a program conducted by a physical therapist assistant.

Physical therapists usually perform their own evaluations of patients. In some hospitals

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and nursing homes, however, the director or assistant director of the physical therapy department may handle this work, which requires extensive training and experience. Therapists may treat patients with a wide variety of problems, or they may specialize in pediatrics, geriatrics, orthopedics, sports medicine, neurology, or cardiopulmonary diseases.

Working Conditions

Physical therapists generally work in pleasant surroundings. Evening and weekend hours may be required, especially for those in private practice who must be available at times convenient for their patients. The job can be physically exhausting. In addition to standing for long periods, therapists must move equipment and help patients turn, stand, or walk.

Employment

Physical therapists held more than 43,000 jobs in 1982. Many jobs are part time, and, indeed, one-fifth of all therapists hold a part-time job.

About 2 out of 5 jobs for physical therapists are in hospitals. Many jobs are in nursing homes—either staff positions or contract services provided by consulting firms or independent practitioners. Therapists also work in rehabilitation centers, schools and residential facilities for handicapped children, home health agencies, outpatient clinics, and physicians' offices.

As the accompanying chart shows, a substantial number of physical therapists are in solo or group practice, normally treating clients referred to them by physicians. In a few States, physical therapists treat clients who come directly to them without first being referred by a physician.

Some therapists teach, conduct research, or serve as consultants.

Training, Other Qualifications, and Advancement

All States, the District of Columbia, and the Commonwealth of Puerto Rico require a license to practice physical therapy. Applicants must have a degree or certificate from an accredited physical therapy educational program and pass a State licensure examination.

Three different types of programs provide educational preparation for entry level jobs in this field: Bachelor's degree programs in physical therapy; certificate (or second bachelor's degree) programs for those who already hold a bachelor's in another field, such as biology; and entry level master's degree programs in physical therapy.

In 1983, entry level training was offered in 84 bachelor's degree programs, 6 certificate programs, and 10 master's degree programs. One of the master's degree programs is sponsored jointly by the U.S. Army and Baylor University; graduates are commissioned as officers in the Army. In addition, 25 master's degree programs and 7 doctoral degree programs offered advanced training for physical therapists.

The physical therapy curriculum includes science courses such as anatomy, physiology, neuroanatomy, and neurophysiology; it also includes specialized courses such as biomechanics of motion, human growth and development, manifestations of disease and trauma, and courses in specific therapeutic procedures. Besides receiving classroom instruction, students get supervised clinical experience administering physical therapy to patients in hospitals and other treatment centers.

Competition for entry to physical therapy programs is keen. Consequently, students seriously interested in attending a physical therapy program must attain superior grades in their earlier studies, especially in science courses. High school courses that are useful include health, biology, chemistry, social science, mathematics, and physics.

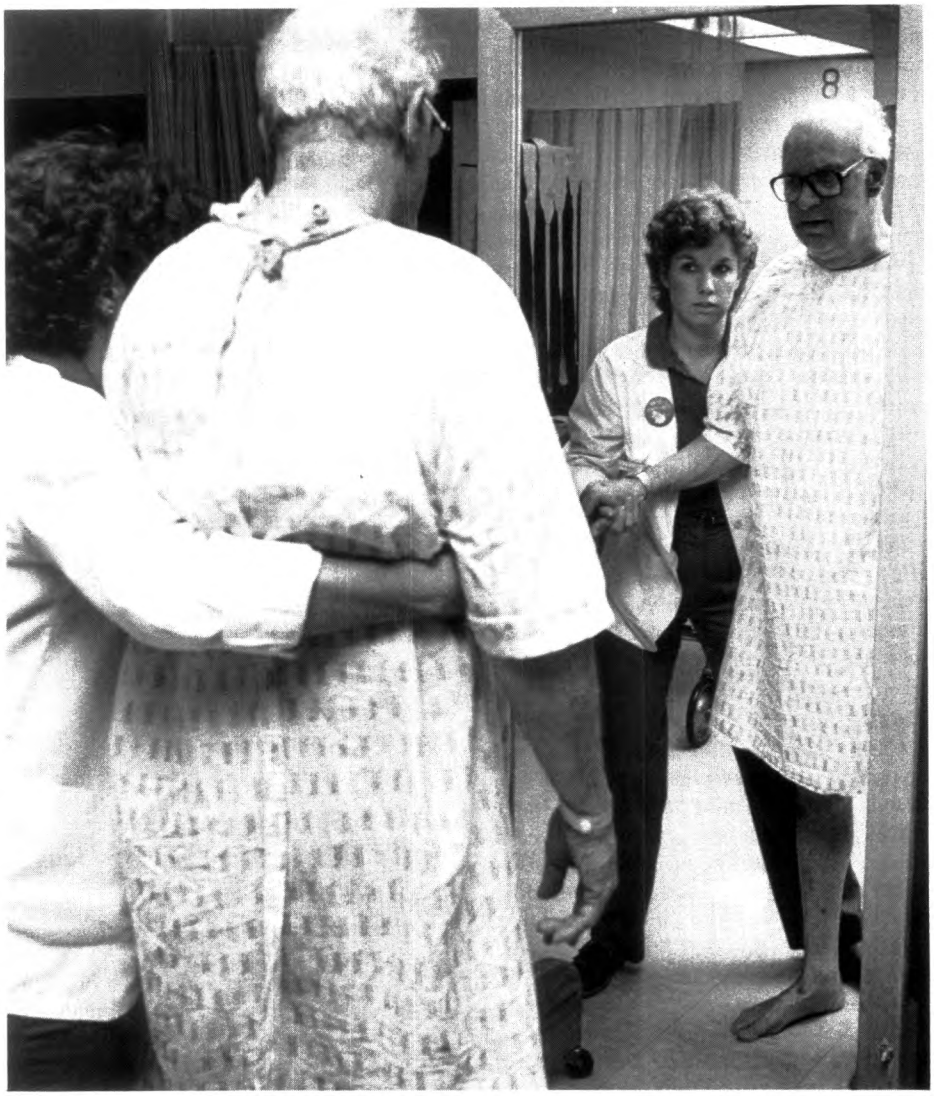
Personal traits that physical therapists need include patience, tact, resourcefulness, and emotional stability to help patients and their families understand the treatments and adjust to their handicaps. Physical therapists also should have manual dexterity and physical stamina. Many persons who want 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. Indeed, such experience is required for admission to some education programs.

A graduate degree combined with clinical experience increases opportunities for advancement, especially to teaching, research, and administrative positions.

Job Outlook

Employment of physical therapists is expected to grow much faster than the average for all occupations through the mid-1990's because of anticipated rapid growth in rehabilitation services. Many additional openings will result from replacement needs.

Most new positions for physical therapists will result from the expansion of programs to aid disabled persons—a diverse and growing population. The aging of the population will spur demand, for the number of people who need therapy will increase sharply: Very rapid growth is projected for the population age 75 and above, a group that suffers a relatively high incidence of disabling conditions. However, the degree to which population growth is translated into additional jobs for physical therapists will depend upon other factors as well, including the extent to which health care providers encourage



The aging of the population contributes to the growing demand for physical therapists.

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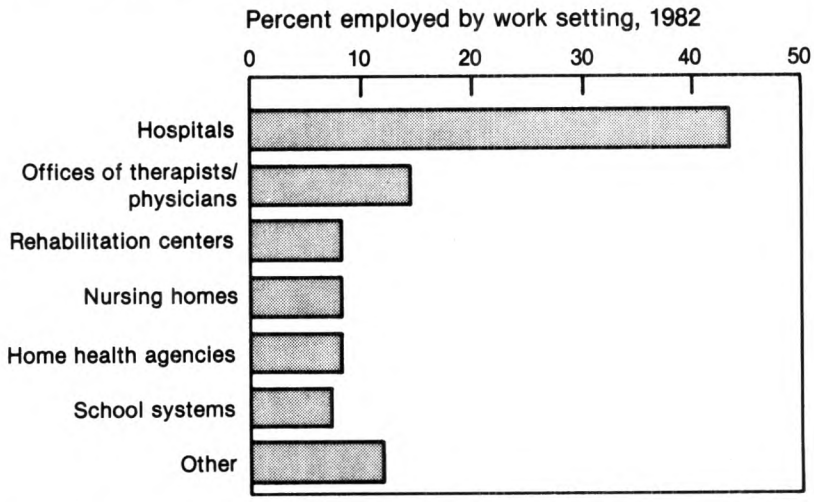
Physical therapists practice in a variety of settings.



SOURCE: American Physical Therapy Association

this level of care for elderly patients, and the availability of funds to pay for it.

Only part of the increasing number of persons requiring rehabilitation services will stem from the aging of the population. Young persons, too, need physical therapy. Advances in medical technology have saved lives that only a few years ago would have been lost: Children with severe birth defects, for example, and car crash victims, many of whom are teenagers and young adults. Future biomedical developments are certain to permit even more people to survive traumas that in the past would have been fatal, thereby creating a need for rehabilitative care.

Job prospects in physical therapy should be very good through the mid-1990's. New graduates are in great demand, and the number of people completing training programs is expected to fall short of that needed to fill job openings. Total enrollments in accredited physical therapy programs have remained relatively stable since the mid-1970's. If program completions remain at current levels and demand for rehabilitation services continues to increase, prospects for jobseekers should become even more favorable than they are today.

Earnings

Starting salaries in hospitals for new physical therapy graduates averaged about $18,000 a year in 1982, according to a national survey conducted by the University of Texas Medical Branch. A 1982 survey conducted by the American Physical Therapy Association disclosed that the average earnings for all salaried physical therapists was $23,000 and some earned more than $35,000 a year.

Beginning therapists employed by the Federal Government earned starting salaries of $15,000 a year in 1982. The average salary paid therapists was about $23,700 annually; supervisory therapists may earn more than $33,000.

Related Occupations

Physical therapists are concerned with the treatment and rehabilitation of persons with physical or mental disabilities or disorders. They may use exercise, massage, heat, water, electricity, and various therapeutic devices to help their patients gain independence. Others who do similar work include occupational therapists, speech pathologists and audiologists, orthotists, prosthetists, and respiratory therapists.

Sources of Additional Information

Additional information on a career as a physical therapist and a list of accredited educational programs in physical therapy are available from:

American Physical Therapy Association, 1111 North Fairfax St., Alexandria, Va. 22314.

Physician Assistants

(D.O.T. 079.364-018)

Nature of the Work

The occupation of physician assistant (PA) came into being during the 1960's, when physicians were in short supply. Additional education enabled medical corpsmen trained during the Vietnam conflict as well as some nurses and others with patient-care experience to relieve physicians of many essential but time-consuming tasks. PA's interview patients, take medical histories, perform physical examinations, order laboratory tests, make tentative diagnoses, and prescribe appropriate treatments. Studies show they have the ability to care for 8 out of 10 people who visit a family practitioner's office in any one day. PA's, however, always work under the direction of a licensed "supervising physician."

Alternative titles sometimes used by these workers are MEDEX, physician associate, and community health medic. Some PA's assist physicians in such specialty areas as pediatrics or surgery. They perform routine procedures such as physical examinations, provide postoperative care, and assist during complicated medical procedures such as cardiac catheterizations. These specialist PA's include *child health associates*, *orthopedic physician assistants*, *urologic physician assistants*, *surgeon assistants*, and *emergency room physician assistants*.

Working Conditions

Physician assistants work in the same places as physicians. Hospitals, clinics, and physicians' offices usually provide a comfortable, well-lighted environment, although PA's must often stand for long periods and do considerable walking.

The workweek and schedule vary according to the setting. Some emergency room PA's work 24-hour shifts twice weekly, and others work three 12-hour shifts each week. The workweek of PA's who work in physicians' offices may include some night office hours or early morning hospital rounds to visit patients. PA's in clinics usually work a 5-day, 40-hour week.

Employment

Physician assistants held about 22,000 jobs in 1982. They most commonly work for physicians in private practice. However, hospitals employ an increasing proportion of PA's—now about 25 percent. A small but growing number work for health maintenance organizations, other prepaid health plans, or clinics.

Despite efforts to encourage physicians to practice where they are needed most, many rural areas and inner cities remain underserved. Almost 20 percent of all Americans live in counties with a population of less than 50,000, yet only 8 percent of all active physicians practice in these areas. The 45 percent of all PA's who practice there provide badly needed health care service.

Although most PA's in medically underserved areas are associated with physicians in private practice, some work in clinics, where a physician may be available just 1 or 2 days each week. For the rest of the week, a PA working with one or more nurses, technicians, or medical assistants provides all health care services. PA's in these clinics usually have quick telephone access to a physician for consultation, but experience has shown that normally few consultations are needed. The Rural Health Clinics Service Act of 1977 helped promote this type of practice by making reimbursement by Medicare easier; currently, over 10 percent of all PA's practice in one of these clinics.

Training, Other Qualifications, and Advancement

In the early years of the occupation, informal training was not uncommon, but today, nearly all States require that new PA's complete an approved program. Approximately 15,000 PA's had completed such training programs by 1982. Fifty-four educational programs for primary

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A physician assistant monitors emergency medical treatment on the way to the hospital.

care physician assistants and 3 programs for surgeon assistants were approved by the Committee on Allied Health Education and Accreditation (CAHEA) of the American Medical Association.

Admission requirements vary, but 2 years of coursework at the college level in science or one of the health professions is usually the minimum requirement. Most applicants, in fact, hold a bachelor's or higher degree.

A background in one of the health professions is an important qualification for entry to these highly-competive programs. Most programs prefer applicants with clinical experience in jobs ranging from medical technologist to registered nurse, and nearly all PA students have such a background.

Educational programs are generally 2 years in length, although some are longer and a few are shorter. Most PA programs are located in medical schools, schools of allied health, or 4-year colleges; a few are located in community colleges or are hospital based. Regardless of the institutional sponsorship, most accredited PA programs have clinical teaching affiliations with medical schools or medical school faculty.

PA education begins with a classroom or didactic phase that lasts 6 to 24 months. Classroom instruction includes human anatomy, physiology, microbiology, clinical pharmacology, applied psychology, clinical medicine, and medical ethics. During the program's last 9 to 15 months, students do supervised clinical work designed to develop practitioners' skills. Clinical training begins with a series of clinical practice assignments or rotations. These rotations include family practice, inpatient and ambulatory medicine, general surgery, obstetrics and gynecology, emergency medicine, internal medicine, psychiatry, and pediatrics. Sometimes, one or more of the rotations are served under the "preceptorship" or supervision of a physician who is seeking to hire a PA. This learning experience often leads to a permanent position.

The number of PA programs that award a bachelor's degree has been growing, and currently about two-thirds of the programs do so. Most of the remaining programs offer a certificate and/or associate degree; one offers an M.S. option.

MEDEX programs, which last about 18 months, are slightly shorter than other PA programs. MEDEX programs are designed for people who have had extensive, direct patient care experience, usually in roles such as medical corpsman or registered nurse. This background allows for a shorter period of classroom training and increased emphasis on clinical experience. MEDEX students usually gain most of their supervised clinical experience working with the physician who will hire them upon graduation.

Postgraduate education for PA's, termed the "PA residency", is a recent development. Residency programs, as yet unaccredited, are available in emergency medicine, general surgery, neonatology, and occupational medicine.

State laws and regulations govern the use of the title "physician assistant" and the scope of PA practice in all but a few States. Most States require that PA's be graduates of accredited educational programs and 35 States require that PA's be certified by the National Commission on Certification of Physician Assistants, Inc. (NCCPA). NCCPA certification attests to clinical competence; in 1982, about 12,000 PA's had gained certification.

The PA's scope of practice—the duties he or she may perform—is determined in some States by the supervising physician and in others by the State's regulatory agency. There is considerable variation among State laws and regulations and changes commonly occur. Aspiring PA's should investigate the laws and regulations where they wish to practice.

Individuals planning a career as a physician assistant should be conscientious and willing to study a great deal throughout their career to keep up with medical advances. They should exhibit leadership, self-confidence, and emotional stability. A pleasant personality, patience, and the ability to deal with all kinds of people are essential.

Formal lines of advancement have not evolved within this young profession. There are no head PA's in hospitals or nursing homes as there are head nurses; by the very nature of the profession, individual PA's are supervised by physicians. Since a supervising physician shares responsibility for the quality of care rendered by the PA, this relationship must be a close one.

Some PA's advance after additional education to practice in a specialty area such as emergency medicine; others advance with experience to added responsibilities and higher earnings although earnings generally level off within 7 or 8 years after graduation.

Job Outlook

Job opportunities for PA's through the mid-1990's are expected to reflect average employment growth as well as the need to replace experienced PA's who leave the profession.

The occupation, though still small, has experienced extraordinary growth: The number of formally trained PA's was fewer than 100 in 1970. Hospitals are hiring PA's to replace resident physicians and foreign medical graduates, as fewer foreign graduates enter the country and the number of surgical residency programs is reduced. Moreover, follow-up data reveal that nearly all newly trained PA's find work. New graduates may have to accept jobs in medically underserved areas, but they do not view this as a hardship. Most PA students report a preference to practice in a small city or town.

Long-term prospects for PA's are difficult to assess, largely because of unresolved issues in health policy. Restrictions on reimbursement for the services of PA's is one of the most important questions clouding the profession's future. Studies have established that substituting PA's for some physicians can lower costs without reducing the quality of care. However, the majority of health insurance programs—including Medicare and Medicaid—do not generally provide reimbursement for services performed solely by a PA. This uncertainty regarding payment makes some hospitals and physicians reluctant to hire PA's.

Another unsettling factor is the diversity of State laws that regulate the kinds of services PA's may perform. In some States, they have the authority to make medical decisions and prescribe treatment without the immediate supervision of a physician. In others, they are allowed to practice only where a licensed physician is present. Most States restrict the number of drugs a PA can prescribe and some States prohibit PA's from writing prescriptions altogether. Furthermore, laws regarding PA practice are under review in some States, where proposals to expand their scope of practice have aroused the opposition of other health providers. Employers may be reluctant to hire PA's without knowing what rules will govern their use in coming years.

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The now-plentiful supply of physicians also affects prospects for PA's. In the early 1960's, the Federal Government took steps to expand the number of graduates from U.S. medical schools. As a result, medical school enrollments doubled between 1965 and 1980, and the number of physicians in practice has risen sharply. Barring a major surge in demand for medical services, the increasingly abundant supply of physicians is expected to lower patient loads for physicians and possibly decrease the demand for PA's in urban areas.

Some developments could heighten rather than curtail demand for PA's. More doctors are locating in medically underserved areas, which could open up additional employment opportunities for PA's. Current emphasis on cost containment may increase the number of health maintenance organizations (HMO's) and other kinds of prepaid health plans. Such plans, which provide complete health care services to members for a set annual charge, employ physician assistants, nurse-midwives, and nurse practitioners in place of some physicians. Because the plan collects payment directly from the client, the reimbursement problem does not arise. A greater role for HMO's in the delivery of health care is just one of a number of possible consequences of the effort to bring health care spending under control. The overall effect would undoubtedly be increased demand for PA's and other physician-extenders.

The aging of the population could also favorably affect employment of PA's. Compared to younger people, the elderly visit physicians more often, spend more money on medicine and drugs, and spend much more time in hospitals. Resolution of the reimbursement issue could lead to greater employment of PA's by nursing homes and home health agencies that serve the elderly.

Also affecting the outlook for PA's are enrollments in PA training programs. In recent years, enrollments have leveled off. If enrollments remain stable while demand for PA's continues to grow, job opportunities for these workers should be even more favorable.

Earnings

In 1982, physician assistants starting work in hospitals and medical centers averaged about $20,500, according to a national survey conducted by the University of Texas Medical Branch. Typically, the highest pay for PA's in these settings was about $26,000, although some earned as much as $37,000.

The average salary of PA's in all settings was about $22,000 in 1982. PA's in health maintenance organizations, hospitals, and physicians' offices earn slightly more than those in clinics.

Veterans Administration hospitals started PA's at about $18,339 a year in 1982. Average earnings for all PA's employed in VA hospitals were about $24,800 in 1982. The highest paid Federal PA's earned $30,500.

Related Occupations

Other health workers who provide patient care that requires a similar level of skill and training include nurse practitioners, physical therapists, and occupational therapists.

Sources of Additional Information

For more information about the profession, send for the brochure, *Physician Assistant*, available free from:

American Academy of Physician Assistants, 1117 North 19th St., Suite 300, Arlington, Va. 22209.

Information on individual PA training programs also is available from:

Association of Physician Assistant Programs, 1117 North 19th St., Suite 300, Arlington, Va. 22209.

The 1983-84 edition of the Association's publication entitled *Profile* lists educational programs and describes each program's accreditation status, admission procedures and requirements, and cost. Information on certification requirements is also given. *Profile* may be ordered from the Association for $10 prepaid.

For eligibility requirements and a description of the Physician Assistant National Certifying Examination write to:

National Commission on Certification of Physician Assistants, Inc., 3384 Peachtree Rd. NE., Suite 560, Atlanta, Ga. 30326.

Information regarding certification for orthopedic physician assistants is available from:

National Board for Certification of Orthopedic Physician Assistants, 304 East 45th St., 11th Floor, New York, N.Y. 10017.

For information regarding training and certification of urologic physician assistants, write:

American Board of Urologic Allied Health Professionals, Inc., 6845 Lake Shore Dr., P.O. Box 9397, Raytown, Mo. 64133.

Registered Nurses

(D.O.T. 075.121-010, .124-010 and -014, .127-010, -014, -018, -022, -026, and -030, .137-010, .264-010 and -014, .371-010, .374-010, -014, -018, and -022)

Nature of the Work

Registered nurses (R.N.'s) perform a wide variety of health care functions. They observe, assess, and record symptoms, reactions, and progress of patients; administer medications; assist in the rehabilitation of patients; instruct patients and family members in proper health maintenance care; and help maintain a physical and emotional environment that promotes recovery. Some R.N.'s administer community health programs, conduct research, or teach. The work setting usually determines the scope of the nurse's responsibilities.

Hospital nurses constitute by far the largest group of nurses. Most are staff nurses who provide skilled bedside nursing care and carry out the medical regimen prescribed by physicians. They may also supervise licensed practical nurses, aides, and orderlies. Hospital nurses usually work with groups of patients who require similar nursing care. For instance, some nurses work with patients who have had surgery; others care for children, the elderly, or the mentally ill.

Registered nurses working in nursing homes provide bedside nursing care to patients convalescing from surgery or an illness, and to those suffering from chronic illnesses and disabilities. They also supervise licensed practical nurses and nursing aides.

Private duty nurses give individual care to patients who need constant attention. They may work in a home, a hospital, or a convalescent institution.

Community health nurses care for patients in clinics, homes, schools, and other community settings. They instruct patients and families in health care and give periodic care as prescribed by a physician. They also may instruct community groups in proper diet and arrange for immunizations. These nurses work with community leaders, teachers, parents, and physicians in community health education. Some community health nurses work in schools.

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.

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 at work, provide needed nursing care, arrange for further medical care if necessary, and offer health counseling. They also may assist with health examinations and inoculations.

Working Conditions

Nurses generally work indoors in well-lighted, comfortable buildings. Community health nurses may be required to travel to patients in all types of weather. Although most nursing tasks are not strenuous, nurses need physical stamina because they spend considerable time walking and standing. Emotional stability is required to cope with human suffering and frequent emergencies. Because patients in hospitals and nursing homes require care at all times, staff nurses in these institutions may have to work nights, weekends, and holidays.

Employment

Registered nurses held about 1,312,000 jobs in 1982. Two out of three jobs were in hospitals, and the rest were in a variety of settings: Nursing homes, community health agencies, physicians' offices, student health programs, schools of nursing, occupational health, private duty nursing, and solo and group practice.

The following tabulation shows the distribution of employed nurses in 1980, using data from the National Sample Survey of Registered Nurses (in percents):

	Percent
Total	100.0
Hospitals	65.6
Nursing homes or long-term care facilities	8.0
Public or community health facilities	6.6
Physicians' or dentists' offices	5.7
Student health services	3.5
Occupational health facilities	2.3
Private duty nursing	1.6
Other	6.7

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A hospital nurse monitors the patient's condition.

Between one-fourth and one-third of all nursing jobs are part time.

Training, Other Qualifications, and Advancement

To obtain the license to practice that is required by all States and the District of Columbia, nurses must graduate from an approved school of nursing and pass a national examination administered by each State. Nurses may be licensed in more than one State, either by examination or endorsement of a license issued by another State.

In 1982, about 1,455 nurse training programs were offered in the United States. In addition, 142 master's degree and 24 doctoral degree programs provided advanced education in nursing.

Nursing training programs vary in length from 2 to 5 years after graduation from high school, depending on the nature of the program. Programs offered by community and junior colleges take about 2 years and lead to an associate degree; hospital-based programs last 2-3 years and lead to a diploma; college and university programs require 4 or 5 years and lead to a baccalaureate degree.

There is considerable controversy about the relative merits of the various nurse training programs. Some employers have specific preferences, but, with few exceptions, graduates of all these programs qualify for entry level staff nurse positions after passing the licensing examinations.

Individuals considering a career in nursing should bear in mind that the kind of program they choose—associate, diploma, or bachelor's degree—will affect their future opportunities. For supervisory or administrative positions, for jobs in public health agencies, and for admission to graduate nursing programs, for example, a bachelor's degree in nursing is necessary. Those considering research, consulting, teaching, or a clinical specialization also should start their nursing education in a bachelor's program.

Some R.N.'s trained in diploma or associate degree programs subsequently enter baccalaureate degree programs to prepare for a broader scope of nursing practice, but this can be a costly and time-consuming way of securing baccalaureate level preparation.

All nurse training programs include classroom instruction and supervised nursing practice in hospitals and other health facilities. Students take courses in anatomy, physiology, microbiology, nutrition, psychology, and nursing. 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 community agencies to learn how to care for patients in clinics and in patients' homes. Varying amounts of general education are combined with nursing education in all three types of programs.

From staff positions in hospitals, experienced nurses may be promoted to the position of head nurse, assistant director, and eventually, director of nursing services.

For nurses who prefer close contact with patients, career advancement may mean becoming a clinical nurse specialist, nurse practitioner, nurse clinician, or nurse anesthetist. Graduate level preparation is necessary to reach these positions, all of which are distinguished by the ability to exercise a high degree of independent judgment in assessing nursing problems and determining priorities of care. Training is offered in hospitals and universities, normally lasts 1-2 years, and leads to a certificate or master's degree. Applicants must be R.N.'s and many programs require up to 2 years of nursing experience in a relevant specialty.

Nurse anesthetists complete a certificate program allowing them to administer anesthesia under the direction of a physician. Nurse practitioners and nurse midwives have graduate level training in diagnostic and health assessment skills that enables them to perform certain duties normally performed by a physician. Clinical nurse specialists and nurse clinicians have expertise in a clinical area such as pediatrics or gerontology/geriatrics which usually is obtained through completion of a master's degree program.

Both clinical specialists and nurse practitioners can seek certification of their advanced status in nursing. The American Nurses' Association grants certification to those who meet requirements for advanced training and experience and pass the certification examination.

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 accept responsibility and direct or supervise the activity of others; they must have initiative, and in appropriate situations be able to follow orders precisely or determine if additional consultation is required; and they must use good judgment in emergencies.

Job Outlook

Employment of registered nurses is expected to rise faster than the average for all occupations through the mid-1990's in response to the health care needs of a growing and aging population.

As in most other occupations, replacement needs will be the main source of jobs, even though R.N.'s show a strong attachment to their field. Compared to workers in other occupations requiring a similar amount of training, R.N.'s are less likely to transfer to another occupation. Persons who stop working as registered nurses tend to stop working altogether, at least for a while; most resume homemaking responsibilities. Licensed R.N.'s not currently in the field augment the supply of approximately 75,000-80,000 individuals who complete nursing education programs every year.

The rapidly growing demand for registered nurses is in part a function of their training, which permits them to work effectively in a wide variety of roles and employment settings. Registered nurses' technical skills make them more versatile than licensed practical nurses and nursing aides, for example. In hospitals, the growth of intensive-care and special care units for seriously ill patients has spurred demand for clinically specialized nursing personnel, and this trend in favor of nursing personnel with higher levels of formal preparation is certain to continue with the widespread application of sophisticated medical technologies.

Efforts to hold down health care costs are likely to produce organizational changes in the delivery of health care, including shifts in staffing patterns in hospitals and nursing homes. Although these changes and their consequences are a matter of conjecture, R.N.'s probably will be affected favorably. For example, R.N.'s are well suited for work in the rapidly emerging "alternative" delivery systems such as health

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maintenance organizations, ambulatory surgical clinics, and free-standing emergency centers.

The shortage of R.N.'s abated as the 1981-82 recession decreased personal spending on health care and increased the number of R.N.'s seeking jobs. Shortages remain, however, particularly in rural areas, some big city hospitals, and certain specialities, such as geriatrics.

Some competition is expected through the mid-1990's for the more desirable, higher paying jobs, especially in areas considered highly attractive because of climate, recreational and cultural facilities, and in areas where training programs abound. Nurses with a bachelor's degree should have the best prospects in those areas. For nurses who have advanced training, the outlook is excellent for obtaining positions as administrators, faculty, clinical specialists, and community health nurses.

Earnings

Median annual earnings of registered nurses who worked full time in 1982 were about $19,000. The middle 50 percent earned between about $16,000 and $23,000. The lowest 10 percent earned about $12,000 or less. The top 10 percent, many of whom probably were head or supervisory nurses, earned more than $27,000.

According to a survey conducted by the Bureau of Labor Statistics, general duty nurses employed full time in nursing homes in large metropolitan areas earned annual average salaries ranging from $15,000 to $22,000 in 1982. Full-time head nurses earned from $15,000 to $25,000 in these nursing homes.

In 1982, the Veterans Administration paid inexperienced nurses who had a diploma or an associate degree the starting salary of $14,901 a year; those with a bachelor's degree, $17,431. Nurses employed in all Federal Government agencies earned an average of about $23,000 in 1982.

Starting salaries of registered nurses employed in hospitals, medical schools, and medical centers averaged about $17,600 a year in 1982, according to a national survey conducted by the University of Texas Medical Branch. Experienced R.N.'s averaged about $23,300. This survey also showed that head nurses averaged starting salaries of about $21,800 and experienced salaries of $28,500; nurse anesthetists, $25,900 and $34,200; and clinical nurse specialists, $21,500 and $28,600.

Most hospital and nursing home nurses receive extra pay for work on evening or night shifts. Nearly all receive from 5 to 13 paid holidays a year, at least 2 weeks of paid vacation after 1 year of employment, and health and retirement benefits.

Related Occupations

Other occupations with responsibilities and duties similar to those of registered nurses include: Occupational therapists, paramedics, physical therapists, physician assistants, and respiratory therapists.

Sources of Additional Information

The National League for Nursing (NLN) publishes a variety of materials about nursing and nursing education, including a list of approved schools of nursing and information on student financial aid. One brochure describes master's degree programs to prepare nurse practitioners, clinical specialists, and nurse educators. For a complete list of NLN publications, write for a career information brochure. Send your request to:

Career Information Services, National League for Nursing, 10 Columbus Circle, New York, N.Y. 10019.

Information on career opportunities as a registered nurse is available from:

American Nurses' Association, 2420 Pershing Rd., Kansas City, Mo. 64108.

Information about employment opportunities in Veterans Administration hospitals is available from local Veterans Administration hospitals and also from:

Recruitment Division, Veterans Administration, 810 Vermont Ave. NW., Washington, D.C. 20420.

For information on nursing careers in hospitals, contact:

American Hospital Association, Division of Nursing, 840 North Lake Shore Dr., Chicago, Ill. 60611.

For a copy of *Health Careers in Long-Term Care*, write:

American Health Care Association, 1200 15th St. NW., Washington, D.C. 20005.

Respiratory Therapists

(D.O.T. 079.361)

Nature of the Work

Respiratory therapists, sometimes called inhalation therapists, treat patients who have cardiorespiratory problems. Treatment may range from giving temporary relief to patients with chronic asthma or emphysema to giving emergency care for heart failure, stroke, drowning, or shock. Respiratory therapists are among the first medical specialists called for emergency treatment of acute respiratory conditions arising from head injury or drug poisoning. Their role is a highly responsible one because a patient who stops breathing for longer than 3 to 5 minutes has little chance of recovery without serious brain damage. If oxygen is cut off for more than 9 minutes, death results.

Following doctors' orders, respiratory therapists use special equipment, such as respirators and positive-pressure breathing machines, to treat patients who need temporary or emergency respiratory assistance. For example, they use aerosol inhalants to confine medication to the lungs. They often treat patients who have undergone surgery. The anesthesia administered during surgery depresses respiration, so in some cases respiratory therapy is prescribed to restore full, deep breathing and protect the patient against respiratory illness that could complicate recovery. They also show patients and their families how to use 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. Some therapists teach or supervise other respiratory therapy personnel.

Working Conditions

Respiratory therapists generally work a 40-hour week. Because many hospitals operate around the clock, they may be required to work evenings or weekends. Respiratory therapists spend long periods standing and, in an emergency, may work under a great deal of stress. The inhalants they work with are highly flammable; however, adherence to safety precautions and regular testing of equipment minimize the danger of fire.

Employment

Respiratory therapists held about 46,000 jobs in 1982. About 9 out of 10 jobs were located in hospitals in departments of respiratory therapy, anesthesiology, or pulmonary medicine. Oxygen equipment rental companies, ambulance services, nursing homes, and free-standing surgical centers accounted for most of the remaining jobs.

Training, Other Qualifications, and Advancement

Respiratory apparatus has become more complex in recent years and formal training is increasingly important for entry to the field. Voluntary certification for respiratory therapy workers is available through the National Board for Respiratory Care. Many employers consider such certification important in choosing among candidates. California is the only State that requires respiratory therapy workers to be licensed.

Training for respiratory therapy is offered at the postsecondary level in hospitals, medical schools, colleges and universities, trade schools, vocational-technical institutes, and the Armed Forces. In 1982, about 200 programs in respiratory therapy were approved by the Committee on Allied Health Education and Accreditation (CAHEA) of the American Medical Association. Another 200 programs offered CAHEA-approved preparation for respiratory therapy technicians.

Formal training programs vary in length and in the credential or degree awarded. About 20 of the CAHEA-approved therapist programs are 4-year programs that lead to a bachelor's degree; most of the others are somewhat shorter in length and lead to an associate degree. Technician courses usually last about 1 year and graduates are awarded certificates. Areas of study for both types of programs include human anatomy and physiology, chemistry, physics, microbiology, and mathematics. Technical courses deal with procedures, equipment, and clinical tests.

People who want to enter the respiratory therapy field should enjoy working with people and should be sensitive to patients' physical and psychological needs. Respiratory therapy

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Explaining the steps in respiratory therapy treatment is necessary to ensure the patient's cooperation.

workers must pay attention to detail, follow instructions, and work as part of a team. Operating complicated respiratory therapy equipment requires mechanical ability and manual dexterity. High school students interested in this field are encouraged to take courses in health, biology, mathematics, physics, and bookkeeping.

Respiratory technicians and assistants can advance to the therapist level by taking the appropriate courses. Indeed, some students in respiratory therapist programs work part time as hospital technicians.

For respiratory therapists, advancement in clinical practice goes from care of "general" to "critical" patients. Extra skills are needed to judge the condition of patients with breathing problems as well as other organ system (heart, kidney, etc.) failures. Ability to combine breathing care with many other nursing and medical functions is also required.

Therapists may also advance into supervision and management positions and with additional academic training or experience may direct the respiratory therapy department. Credentials as a Registered Respiratory Therapist (RRT) often are required for administrative positions.

The field of education also offers opportunities for career development. Jobs for hospital "in-service" educators are widely available, especially for therapists with skills or training in teaching. Many therapists have found careers as instructors in respiratory-therapy education programs, and with additional academic preparation they are eligible to advance up the line to professor or program director.

Job Outlook

Employment of respiratory therapists is expected to grow faster than the average for all occupations through the mid-1990's as a result of population growth, widespread accessibility of hospital and surgical care through public and private health insurance, and the development of new diagnostic and treatment procedures in this field. Most openings, however, will arise from the need to replace individuals who transfer to other occupations or stop working altogether.

Future demand for these workers will also reflect the health care needs of an aging population. The rate of surgery has increased, with the most pronounced increase in operations occurring among persons 65 years of age and older, the segment of the population with the greatest frequency of heart and lung problems. The increased rate of surgery among the elderly results partly from safer and more effective surgical procedures. If this trend continues, demand for respiratory therapy workers will be heightened. Morever, lung disease is on the increase and trained therapists will be needed to treat these patients. It is also expected that opportunities will increase in home care and in rehabilitation.

Employment prospects should continue to be excellent for experienced therapists and for recent graduates of formal training programs. However, the increasing availability of formally trained therapy workers may make entry more difficult for people with neither training nor experience.

Earnings

The starting salary of respiratory therapists employed in hospitals averaged about $15,400 a year in 1982, according to a survey conducted by the University of Texas Medical Branch. Experienced respiratory therapists in hospitals earned an average salary of $19,700 a year in 1982.

In 1982, the Federal Government paid respiratory therapists with 2 years of CAHEA-accredited postsecondary school training starting salaries of about $12,000 to $13,000.

Respiratory therapy workers in hospitals receive the same benefits as other hospital personnel, including health insurance, retirement benefits, and vacations and sick leave. Some employers provide tuition assistance and other educational benefits, uniforms, and parking.

Related Occupations

Respiratory therapy workers, under the supervision of a physician, administer respiratory therapy care and life support to patients with heart and lung difficulties. Other workers who care for, treat, or train people to improve their physical well-being include: Dialysis technicians, emergency medical technicians, licensed practical nurses, registered nurses, occupational therapists, and physical therapists.

Sources of Additional Information

Information concerning education programs is available from:

American Association for Respiratory Therapy, 1720 Regal Row, Suite 112, Dallas, Tex. 75235.

Information on the credentialing of respiratory therapy workers can be obtained from:

The National Board for Respiratory Care, Inc., 11015 West 75th Terrace, Shawnee Mission, Kans. 66214.

For the current list of CAHEA-approved programs for respiratory therapy occupations, write:

Department of Allied Health Education and Accreditation, American Medical Association, 535 N. Dearborn St., Chicago, Ill. 60610.

Many respiratory therapy workers receive formal training in hospitals, vocational-technical institutes, private trade schools, and other noncollegiate settings. Local hospitals can provide information on training opportunities for this and other health occupations. Nonhospital vocational programs are listed, by city and State, in the 1982 edition of *Postsecondary Schools with Occupational Programs*, a publication of the U.S. Department of Education's National Center for Education Statistics. This publication may be available in counseling centers or large public libraries.

Speech Pathologists and Audiologists

(D.O.T. 076.101 and .107)

Nature of the Work

Almost 1 American in 10 is unable to speak or hear clearly. When not treated, speech, language, and hearing impairments are serious handicaps that can cause problems throughout life. Children who have difficulty speaking, understanding language, or hearing cannot participate fully with other children in play or in

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ordinary classroom activities. Sometimes these children seem to have mental or emotional problems, when in fact the problem is language or hearing. Adults with speech, language, or hearing impairments may have adjustment problems on the job. Speech pathologists and audiologists provide direct services to these people by evaluating their speech, language, or hearing abilities and providing treatment.

Speech pathologists work 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, learning disabilities, mental retardation, emotional problems, or foreign dialect. Audiologists assess and treat hearing problems, sometimes by fitting and dispensing hearing aids. However, speech and hearing 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, such as those in schools and hospitals, they use diagnostic procedures to identify and evaluate speech, language, and hearing disorders. Then, in cooperation with physicians, psychologists, physical therapists, and counselors, they develop and implement an organized program of therapy.

Although most speech pathologists and audiologists do some administrative work, directors of clinics and coordinators of speech, language, and hearing in schools, health departments or other government agencies may be totally involved in administration.

Working Conditions

Speech pathologists and audiologists generally work in clean, comfortable surroundings and spend most of their time at a desk or table. Although the job is not physically demanding, the close attention to detail and intense concentration needed can be mentally exhausting. A great deal of satisfaction can be gained from seeing a client improve. Lack of progress, on the other hand, can be very frustrating.

Employment

Speech pathologists and audiologists held about 42,000 jobs in 1982. Over two-thirds worked in elementary and secondary schools and colleges and universities. The rest worked in hospitals and nursing facilities, speech, language, and hearing centers, offices of physicians, government agencies, and in private practice.

Training, Other Qualifications, and Advancement

A master's degree in speech-language pathology or audiology is the standard credential in this field. Medicare and Medicaid, for example, only pay for speech-language pathology services provided by a practitioner with a master's degree. Those working in public schools generally are required to have a practice certificate issued by the State educational agency. Some States permit those with only a bachelor's degree in speech pathology or audiology to practice in public schools, but often these persons are considered teachers rather than speech pathologists or audiologists.

In 34 States, licenses are required for those offering speech pathology and audiology services in private practice, clinics, or other settings outside of schools. Licensure requirements vary among the States but usually include graduation from an accredited master's degree program in speech-language pathology or audiology. Clinical experience and an examination are also required. Undergraduate courses in speech-language pathology and audiology programs include anatomy, physiology, physics, acoustics, sociology, linguistics, and phonetics. Courses in speech, language, and hearing disorders as well as in child psychology and psychology of the exceptional child also are helpful.

In 1982, about 240 colleges and universities offered master's or Ph.D. programs in speech-language pathology and audiology. Courses include advanced anatomy and physiology of the areas involved in hearing, speech, and language; acoustics; psychological aspects of communication; and analysis of speech production, language abilities, and auditory processes. Graduate students also take courses in the evaluation and remediation of speech, language, and hearing disorders and receive supervised clinical training in communicative disorders.

Meeting the American Speech-Language-Hearing Association's (ASHA) requirements for a Certificate of Clinical Competence (CCC) usually is necessary to advance professionally. To earn the CCC, a person must have a master's degree or its equivalent, complete a 9-month internship approved by the association, and pass a national written examination.

Speech pathologists and audiologists should be able to approach problems objectively and have a concern for the needs of others. They also should have considerable patience, because a client's progress often is slow. In addition, they should be able to work with detail, to accept responsibility, to work independently, and to direct others.

Job Outlook

Employment of speech pathologists and audiologists is expected to increase about as fast as the average for all occupations through the mid-1990's. Population growth will add to the number of persons having speech, language, and hearing problems. Emphasis on early recognition and treatment of these problems in children will continue to stimulate demand for clinicians in schools. Many school-age children thought to have learning disabilities actually have language or hearing disorders that speech pathologists and audiologists can treat. Besides job openings created by growth in employment, many speech pathologists and audiologists will be needed to replace those who retire, die, or leave the occupation.

Earnings

Audiologists in hospitals and medical centers were paid about $19,500 to $23,700 a year in 1982, compared to about $18,900 to $23,500 for speech pathologists, according to a national survey conducted by the University of Texas Medical Branch.

The annual starting salary in the Federal Government for speech pathologists and audiologists with a master's degree was about $20,200 in early 1983. Those having a doctoral degree were eligible to start at about $24,500.

Related Occupations

Speech pathologists and audiologists specialize in the diagnosis and treatment of speech, language, and hearing problems. Workers in other professions who also perform rehabilitative functions include occupational therapists, optometrists, physical therapists, and some physicians and podiatrists.

Sources of Additional Information

State departments of education can supply information on certification requirements for those who wish to work in public schools.

General information on speech pathology and audiology is available from:

American Speech-Language-Hearing Association, 10801 Rockville Pike, Rockville, Md. 20852.

Over two-thirds of all speech pathologists and audiologists work in educational institutions.

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OTHER DIETETIC AND THERAPY OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Dietetic technicians	Provide service in assigned areas of food service management. Teach principles of food and nutrition and provide dietary counseling under direction of dietitians.	13,000	Much faster than average
Manual arts, music, and recreational therapists	Plan, organize, and direct medically oriented manual arts, musical, or recreational programs in hospital or similar institution to rehabilitate patients who are physically or mentally ill.	18,000	Faster than average
Physical therapy technicians	Administer physical therapy treatment such as massages, heat, light and sound treatment and traction to relieve pain. Instruct, motivate and assist patients in learning and improving functional activities. Assist physical therapists.	33,000	Much faster than average

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Health Technologists and Technicians

Many jobs in the health field owe their existence to the development of new laboratory procedures, diagnostic techniques, and life support systems. Clinical laboratories have been transformed by the installation of automated instruments that offer low-cost analyses in minutes. Elsewhere in the hospital, new kinds of equipment—computerized tomography (CT) scanners, dialysis machines, and ultrasound scanners, for example—have made possible new kinds of medical treatment. Technologies that are possible candidates for widespread use in the years ahead include digital radiography and nuclear magnetic resonance. However, the field of medical diagnostics is changing so rapidly that it is impossible to predict what the next generation of devices will bring. One thing is certain: New occupations will emerge with future advances in medical technology.

Four statements in this section of the *Handbook* describe health careers that involve operating or monitoring biomedical equipment: Radiologic technologists, electrocardiograph technicians, electroencephalographic technologists and technicians, and clinical laboratory technologists and technicians.

Most *radiologic technologists* operate the familiar X-ray machine, but some specialize. *Computerized tomographers*, for example, use equipment linked to a computer for cross-section X-rays of the brain or other parts of the body. *Diagnostic medical sonographers* use equipment which produces an image from sound waves reflected from the body to examine internal organs. *Nuclear medicine technologists* use radioactive substances that show up during imaging, and *radiation therapy technologists* operate the equipment used to treat cancer patients.

Electrocardiograph (EKG) technicians operate equipment that monitors a patient's heart action. Cardiology technology includes far more than the EKG, however, and *cardiology technologists* of various kinds perform or assist with phonocardiograms, echocardiograms, angiograms, stress tests, cardiac catheterizations, and other tests that enable physicians to detect and diagnose heart problems. For example, heart patients scheduled for surgery may be given an echocardiogram (an ultrasound procedure) before cardiac catheterization, often the last step before an operation. Nuclear cardiology and digital subtraction angiography are new cardiac technologies that are likely to gain in importance.

Dialysis technicians, who operate kidney machines, and *perfusionists*, who operate the heart-lung machines used in coronary bypass surgery, are examples of health workers who operate equipment on which patients' lives depend.

Some health occupations are auxiliary jobs redesigned to extend the services of highly skilled health practitioners. The *dental hygienist* expands dental services without sacrificing the quality of care. The *emergency medical technician* provides health care in the absence of a practitioner. These workers are specially trained to provide medical attention when no physician or nurse is available—typically at the site of a fire, automobile accident, or other emergency.

Practical nursing is by far the largest of the health occupations described in this section of the *Handbook*. Licensed practical nurses held about 594,000 jobs in 1982. Other large occupations are clinical laboratory technology and radiologic technology. Most other health technologist occupations are quite small. In fact, fragmentation into a large number of small and highly specialized occupations is typical of the health labor market.

The distinction between a health *technologist* and a health *technician* lies in the complexity of the job. Technologists have more responsibility than technicians, and therefore need more training, which varies with the occupation. For example, *medical technologists*, who use laboratory techniques to test specimens of body fluids and tissues for evidence of disease, need a bachelor's degree in medical technology, chemistry, or biochemistry. *Medical technicians* usually are graduates of 2-year programs. *Electroencephalographic (EEG) technologists*, who operate machinery that monitors the electrical activity of patients' brains, generally complete 1- or 2-year training programs, while training for *EEG technicians* lasts only about 6 months.

Preparation for these careers varies. Some workers learn their skills on the job through classroom and laboratory study combined with closely supervised clinical experience. As a rule, the newer the occupation, the more likely that training will be provided on the job. In most health technologist occupations, however, workers are trained formally in hospitals, medical centers, community colleges, 4-year colleges and universities, vocational-technical institutes, or trade schools. Training requirements for specific occupations are described in the statements that follow.

The Committee on Allied Health Education and Accreditation (CAHEA) accredits training programs for 26 allied health occupations. Information about accredited programs is published annually in the *Allied Health Education Directory*, which may be purchased from:

Department of Allied Health Education and Accreditation, American Medical Association, 535 N. Dearborn St., Chicago, Illinois 60601.

Allied Health Education Programs in Collegiate Settings 1980: A Directory, published by the American Society of Allied Health Professions (ASAHP), identifies all programs in 2-year and 4-year colleges and universities that prepare students for allied health careers. Program listings for specific occupations, arranged by State, are available from ASAHP at 10 cents a page (minimum order $2.00). For details, write:

American Society of Allied Health Professions, One Dupont Circle NW., Suite 300, Washington, D.C. 20036.

Many allied health workers receive their training in hospitals, vocational-technical institutes, private trade schools, and other noncollegiate settings. Such programs are listed, by State, in the 1982 edition of *Postsecondary Schools with Occupational Programs*, a publication of the U.S. Department of Education's National Center for Education Statistics. This publication may be available in counseling centers or large public libraries.

Employment in the health industry is expected to grow faster than the average for all industries through the mid-1990's due to population growth, especially the substantial increase in the number of older people. However, the patient's ability to pay for diagnostic tests, laboratory work, surgery, and hospital stays is one of the most important factors spurring demand. Widespread availability of third-party coverage for hospital and laboratory services under Medicare, Medicaid, and commercial health insurance is expected to assure continued rapid growth in employment of health technologists and technicians.

Currently underway is a broad-based effort to contain the rate of increase in health care costs. To predict what will actually occur is impossible, but cost containment, if successful, could mean sweeping changes in the organization and delivery of health care services in the United States. Changes in the reimbursement system, combined with more stringent review procedures, could slow the purchase of expensive new hospital equipment and also reduce the number of diagnostic tests and procedures that physicians order. Therefore, actual growth in the health technologist occupations may diverge from the rates currently anticipated.

Books and brochures on health careers are available in libraries, counseling centers, and bookstores. The Sources of Additional Information section at the end of each *Handbook* statement identifies organizations that can provide career information, including brochures that describe the work and lists of training programs. For an overview of jobs in the health field, including some jobs not covered in

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the *Handbook*, request a copy of "200 Ways to a Health Career" from:

National Health Council, 1740 Broadway, New York, N.Y. 10019.

Another useful publication is *Health Careers Guidebook*, fourth edition, published in 1979 by the U.S. Department of Health, Education, and Welfare (now the Department of Health and Human Services.) It is available for $7.50 from:

Superintendent of Documents, U.S. Government Printing Office Washington, D.C. 20402.

Clinical Laboratory Technologists and Technicians

(D.O.T. 078.121-010, .161-010, .221-010, .261-010 and -014, .281-010, .361-014 and -030, and .381-014)

Nature of the Work

Laboratory tests play an important part in the detection, diagnosis, and treatment of disease. They are essential in detecting the presence of illnesses in which there are changes in the body fluids and tissues. Examples of such changes include chemical changes in the blood, urine, or lymph; increases or decreases in the count of various types of white or red blood cells; microscopic changes in the structure of the cells of a diseased tissue or organ; and the presence of parasites, viruses, or bacteria in the blood or tissue.

Although physicians use the results of laboratory evaluation and diagnosis, they do not perform the tests themselves. Instead, the tests are done by clinical laboratory personnel. These specialists provide laboratory services ranging from routine tests to highly complex analyses, and their skill level and educational preparation vary accordingly. This section of the *Handbook* discusses the work of two levels of laboratory personnel: Technologists and technicians.

Clinical laboratory personnel examine body tissues and fluids to help determine the cause of an illness.

Medical laboratory technologists have a bachelor's degree in science, as a rule. They perform complicated chemical, biological, hematological, microscopic, and bacteriological tests. These may include chemical tests to determine, for example, the blood cholesterol level, or microscopic examination of the blood to detect the presence of diseases such as leukemia. Technologists 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 the samples for chemical content or reaction. They also may type and cross-match blood samples for transfusions.

Technologists in small laboratories perform many types of tests, while those in large laboratories usually specialize. Among the areas in which they can specialize are biochemistry (the chemical analysis of body fluids), blood bank technology (the collection and preparation of blood products for transfusion), cytotechnology (the study of human body cells), hematology (the study of blood cells), histology (the study of human and animal tissue), and microbiology (the study of bacteria and other micro-organisms).

Most medical technologists conduct tests related to the examination and treatment of patients. Others do research, develop laboratory techniques, teach, or perform administrative duties.

Medical laboratory technicians generally have an associate degree or a diploma or certificate from a private postsecondary trade or technical school. They are midlevel laboratory workers who function under the supervision of a medical technologist or laboratory supervisor. They perform a wide range of complex tests and laboratory procedures which do not require the technical knowledge of medical technologists. Like technologists, they may work in several areas or specialize in one field.

Working Conditions

Clinical laboratory personnel generally work a 5-day, 40-hour week. Those working in a hospital can expect some evening and weekend duty. Laboratory workers may spend a great deal of time on their feet.

Laboratories generally are well lighted and clean. Although unpleasant odors and infectious materials often are present, few hazards exist if proper methods of sterilization and handling of specimens, materials, and equipment are used.

Employment

Clinical laboratory technologists and technicians held about 209,000 jobs in 1982. Medical laboratory technologists accounted for nearly half of these jobs, as the following tabulation shows.

Medical laboratory technologists	103,000
Medical laboratory technicians	57,000
Blood bank specialists	17,000
Biochemistry technologits	11,000
Microbiology technologists	9,000
Histologic technologists	7,000
Cytotechnologists	5,000

Most medical laboratory personnel work in hospitals. Others work in independent laboratories, physicians' offices, clinics, public health agencies, pharmaceutical firms, and research institutions. Laboratory facilities generally are concentrated in metropolitan areas. Some laboratory workers work part time.

In 1982, Veterans Administration hospitals and laboratories employed about 3,700 medical technologists and about 2,200 medical laboratory technicians. Others worked for the U.S. Public Health Service.

Training, Other Qualifications, and Advancement

The usual requirement for a beginning job as a medical technologist is a bachelors degree with a major in medical technology or in one of the life sciences: Biology or biochemistry, for example. It is also possible to qualify through on-the-job experience, specialized training, or a combination of these.

Bachelor's degree programs in medical technology include substantial course work in chemistry, biological sciences, microbiology, and mathematics, plus 1 year of practical experience in laboratory work. These programs are offered by colleges and universities as well as by hospitals. The hospital programs generally are affiliated with colleges or universities and lead to a bachelor's degree, although a few hospital programs require a bachelor's degree for entry.

Many universities offer advanced degrees in medical technology and related clinical laboratory sciences for technologists who plan to specialize in a certain area of laboratory work or in teaching, administration, or research.

Medical laboratory technicians acquire their training in a variety of ways including community and junior colleges, hospitals, and vocational and technical schools. Many programs last 2 years and lead to an associate degree. Some medical laboratory technicians are trained in the Armed Forces.

Persons interested in a clinical laboratory career should be careful about selecting a training program. Prospective employers—hospitals and independent laboratories—may have preferences as to program accreditation. (Accreditation indicates that a training program meets established standards.) Prospective training programs should be able to provide information about the kinds of jobs obtained by graduates, educational costs, the length of time the training program has been in operation, instructional facilities, and faculty qualifications.

Nationally recognized accrediting agencies in the allied health field include the Committee on Allied Health Education and Accreditation (CAHEA) and the Accrediting Bureau of Health Education Schools (ABHES). CAHEA accredits programs that provide training for 26 allied health occupations including medical technologists, cytotechnologists, histologic technicians, specialists in blood bank technology, and medical laboratory technicians. ABHES accredits training programs for medical laboratory technicians and medical assistants.

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Licensure and certification are well established in the health field as methods of regulating the skill and competence of personnel. Licensure refers to the process by which a government agency authorizes individuals to engage in a given occupation and use a particular job title. Occupational licensing takes place at the State level. Several States—including Alabama, California, Florida, Hawaii, Nevada, and Tennessee—require medical technologists or medical laboratory technicians to be licensed. Other states, such as Georgia, require registration. More information is available from State boards of occupational licensing or from State Occupational Information Coordinating Committees.

Certification is a voluntary process by which a nongovernmental organization such as a professional society grants recognition to an individual who meets prescribed standards. Widely accepted by employers in the health industry, certification is a prerequisite for some jobs, and often is necessary for career advancement. Agencies that certify medical laboratory technologists and technicians include the Board of Registry of the American Society of Clinical Pathologists, the American Medical Technologists, the National Certification Agency for Medical Laboratory Personnel, and the Credentialing Commission of the International Society of Clinical Laboratory Technology.

Accuracy, dependability, and the ability to work under pressure are important personal characteristics for a medical laboratory worker. Manual dexterity and normal color vision are highly desirable.

Technologists may advance to supervisory positions in certain areas of laboratory work, or, after several years' experience, to administrative medical technologist in a large hospital. Graduate education in one of the biological sciences, chemistry, management, or education usually speeds advancement. Technicians can advance to technologists by getting additional education and experience.

Job Outlook

Employment of clinical laboratory workers is expected to grow faster than the average for all occupations through the mid-1990's. Most openings, however, will result from the need to replace experienced laboratory personnel who transfer to other occupations or stop working altogether.

Rapid growth in employment is expected because of the importance of laboratory tests for medical diagnosis and treatment. Whenever a physician orders chemotherapy to treat a cancer patient, for example, a demand for clinical laboratory services is created—for tests to monitor blood chemistry, in particular. Advances in clinical research and bioengineering technology are bound to lead to new tests and new kinds of laboratory equipment in coming years, thus spurring demand for laboratory personnel.

Clinical laboratory technology is increasingly able to spot major diseases such as cancer and heart disease in their early, presymptomatic stages, although the use of laboratory tests for early diagnosis is far from widespread. If preventive medicine and early diagnostic screening become more cost-effective, however, and are broadly accepted by the medical community, demand for clinical laboratory services could rise sharply.

Indirectly influencing growth of the field are population growth and aging. Broad coverage for laboratory work under Medicare, Medicaid, and commercial health insurance has been a significant factor in the expansion of clinical laboratories and has contributed to the upward spiral in health expenditures. Recent changes in the health care financing system may encourage hospitals to reduce the use of such services as clinical laboratory work, and to scrutinize outlays for costly new technology and equipment. However, the impact of cost containment efforts on employment of clinical laboratory personnel remains to be seen.

Earnings

Salaries of clinical laboratory personnel vary depending on the employer and geographic location. In general, those in large cities receive the highest salaries.

Starting salaries for medical technologists employed by hospitals, medical schools, and medical centers averaged about $17,100 a year in 1982, according to a survey conducted by the University of Texas Medical Branch. Beginning salaries for cytotechnologists averaged about $15,700; for histology technicians, about $13,600; and for medical laboratory technicians, about $13,300. According to the same survey, experienced medical technologists working in hospitals, medical schools, and medical centers averaged about $22,400 a year in 1982; cytotechnologists averaged about $19,700; and medical laboratory technicians and histology technicians each averaged $17,200.

The Federal Government paid medical technologists a starting salary of about $13,400 a year in 1982. Those having experience, superior academic achievement, or a year of graduate study entered at about $16,600. Starting salaries for technicians began at $11,900 a year in 1982, depending on education and experience. Medical technologists in the Federal Government averaged about $19,900 in 1982, and medical laboratory technicians, about $16,600.

Related Occupations

Clinical laboratory technologists and technicians perform a wide variety of tests to help physicians diagnose and treat disease. Their principal activity is the analysis and identification of substances. Other workers who perform laboratory tests include chemistry technologists, criminalists, and food testers.

Sources of Additional Information

Career information is available from:

American Society of Clinical Pathologists, Board of Registry, P.O. Box 12270, Chicago, Ill. 60612.

American Society for Medical Technology, 330 Meadowfern Drive, Houston, Tex. 77067.

American Medical Technologists, 710 Higgins Rd., Park Ridge, Ill. 60068.

Accrediting Bureau of Health Education Schools, Oak Manor Office, 29089 U.S. 20 West, Elkhart, Ind. 46514.

National Certification Agency for Medical Laboratory Personnel, 1725 DeSales St. NW., Suite 403, Washington, D.C. 20036.

International Society for Clinical Laboratory Technology, 818 Olive St., St. Louis, Mo. 63101.

For a list of CAHEA-approved training programs for clinical laboratory personnel, write:

Committee on Allied Health Education and Accreditation, 535 N. Dearborn St., Chicago, Ill. 60610.

For a list of training programs for medical laboratory technicians accredited by the Accrediting Bureau of Health Education Schools, write:

Secretary-ABHES, 29089 U.S. 20 West, Elkhart, Ind. 46514.

For information about employment opportunities in a Veterans Administration hospital, contact the personnel office of that VA hospital.

Information about employment opportunities with the National Institutes of Health is available from the Clinical Center, National Institutes of Health, Bethesda, Md. 20205.

Dental Hygienists

(D.O.T. 078.361-010)

Nature of the Work

Dental hygienists, working under the direction of a dentist, provide direct patient care; they remove deposits and stains from patients' teeth, expose and develop dental X-ray films, and perform various other preventive and therapeutic services. Helping the public develop and maintain good oral health is another important aspect of the job, and hygienists may instruct patients in the proper selection and use of toothbrushes and other devices, for example, or explain the relationship between diet or smoking and oral health.

Depending on the State law, hygienists may remove scale from teeth; apply topical fluoride to prevent tooth decay; take medical and dental histories; take X-rays; make impressions of teeth for study models; and prepare other diagnostic aids. In some States, dental hygienists may perform pain control and restorative procedures.

Dental hygienists in school systems serve in several capacities. Clinical functions include examining children's teeth, assisting the dentist in determining the dental treatment needed, and reporting the findings to parents. They also scale and polish teeth and give oral hygiene instruction. In addition, they develop and deliver classroom and assembly programs on oral health.

A few dental hygienists assist in research projects. Those having advanced training may teach in schools of dental hygiene.

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Working Conditions

Dental hygienists usually work in clean, well-lighted offices. Important health safeguards for persons in this occupation are regular medical checkups and strict adherence to established procedures for using X-ray equipment. The occupation is one of several covered by the Consumer-Patient Radiation Health and Safety Act of 1981, which encourages the States to adopt uniform standards for the training and certification of individuals who perform medical and dental radiologic procedures.

Most hygienists work fewer than 30 hours per week. Some of this work may be on Saturdays or during evening hours.

Employment

Dental hygienists held about 69,000 jobs in 1982. Because multiple jobholding is common in this field, the number of jobs exceeds the number of individuals at work that year. Because dentists frequently hire hygienists to work only 2 or 3 days a week, hygienists who want a full-time schedule may have to hold more than one job.

Most dental hygienists work in private dental offices. Other places of employment include public health agencies, school systems, business firms, hospitals, clinics, and schools of dental hygiene.

It is not unusual for a dental hygienist to hold several part-time jobs.

Training, Other Qualifications, and Advancement

Dental hygienists must be licensed. To obtain a license, a candidate must graduate from an accredited dental hygiene school and pass both a written and a clinical examination. For the clinical examination, the applicant is required to perform dental hygiene procedures, such as removing deposits and stains from a patient's teeth. In 1983, candidates in 49 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. Few States permit dental hygienists licensed in other States to practice in their jurisdictions without further examination.

In 1982, 202 schools of dental hygiene in the United States were accredited by the Commission on Dental Accreditation. Most programs grant an associate degree; others lead to a bachelor's degree. A few institutions offer both types of programs. Six schools offer master's degree programs in dental hygiene.

Completion of an associate degree program usually is sufficient for the dental hygienist who wants to practice in a private dental office. To do research, teach, and work in public or school health programs, at least a bachelor's degree usually is required. Dental hygienists with a master's degree work as teachers or administrators in dental hygiene and dental assisting training programs, public health agencies, and in associated research.

Competition is keen for admission to dental hygiene schools. The minimum requirement for admission to a school of dental hygiene is graduation from high school. Several schools that offer the bachelor's degree admit students to the dental hygiene program only after they have completed 2 years of college. Dental hygiene training given in the Armed Forces usually does not fully prepare one to pass the licensing exam, but credit for that training may be granted to those who seek admission to accredited dental hygiene programs.

The curriculum in a dental hygiene program consists of courses in the basic sciences, dental sciences, clinical sciences, and liberal arts. These schools offer laboratory, clinical, and classroom instruction in subjects such as anatomy, physiology, chemistry, pharmacology, nutrition, histology (the study of tissue structure), periodontology (the study of gum diseases), dental materials, and clinical dental hygiene.

People who want to become dental hygienists should enjoy working with others. The ability to put patients at ease is helpful, for patients often are under stress. Personal neatness, cleanliness, and good health also are important qualities. Dental hygienists must have manual dexterity because they use various dental instruments with little room for error within a patient's mouth. Among high school courses recommended for aspiring dental hygienists are biology, health, chemistry, speech, and mathematics.

Job Outlook

Employment of dental hygienists is expected to grow faster than the average for all occupations because of the demand for dental care that will be generated by an expanding population, the growing awareness of the importance of oral health, and the availability of dental prepayment plans. Nonetheless, the majority of job openings will result from the need to replace workers who leave the occupation.

Job prospects for dental hygienists are expected to be favorable through the mid-1990's. Opportunities for part-time employment and for work in rural areas also should be good.

The use of dental hygienists is more prevalent in some places than others; more widespread recognition by dentists of hygienists' contribution to heightened productivity is likely to spur demand for these workers in areas where they are not extensively used. Younger dentists, in particular, tend to hire hygienists, because they are taught in dental school how to make effective use of auxiliaries in their dental practice. The trend toward group practice among dentists should also result in jobs for dental hygienists.

The increasingly abundant supply of dentists could work in the opposite direction, restraining demand for hygienists. There is concern that the growing supply of dentists will lead to smaller patient loads. If that occurs, dentists might choose to perform more services themselves and hire fewer auxiliaries.

Earnings

Earnings of dental hygienists are affected by the type of employer, education, and experience of the individual hygienist, and the geographic location. Dental hygienists who work in private dental offices are commonly paid by the hour or day, although they may earn a salary or a commission for work performed.

The median earnings of dental hygienists working full time were about $315 a week in 1982. In 1982, the Federal Government paid dental hygienists with no experience starting salaries of between $12,000 and $13,400 a year depending upon the length of their training. Dental hygienists working for the Federal Government averaged about $15,400 a year, in 1982.

Dental hygienists who work for school systems, health agencies, the Federal Government, or State agencies have the same hours,

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vacation, sick leave, retirement, and health insurance benefits as other workers in these organizations.

Related Occupations

Dental hygienists relieve dentists from many routine tasks. Other occupations performing similar duties for dentists and physicians include dental assistants, dental laboratory technicians, general duty nurses, nurse anesthetists, and radiologic technologists.

Sources of Additional Information

For information on a career in dental hygiene, contact:

Commission on Dental Acccreditation, Suite 1814, American Dental Association, 211 E. Chicago Ave, Chicago, Ill. 60611.

For information about accredited programs and the educational requirements to enter this occupation, contact:

Division of Professional Development, American Dental Hygienists' Association, Suite 3400, 444 N. Michigan Ave., Chicago, Ill. 60611.

The State Board of Dental Examiners in each State, or the American Association of Dental Examiners, 211 E. Chicago Ave., Chicago, Ill. 60611, can supply information on licensing requirements.

Electrocardiograph Technicians

(D.O.T. 078.362-018)

Nature of the Work

Electrocardiograms (EKG's) are graphic heartbeat tracings produced by an instrument called an electrocardiograph. These tracings record the electrical changes that occur during and between heartbeats. Physicians order electrocardiograms to help diagnose certain forms of heart disease and to analyze changes in the condition of a patient's heart over a period of time. Often the test is done before surgery. Some physicians use electrocardiograms as a routine diagnostic procedure for persons who have reached a certain age. In many fields, electrocardiograms are required as part of preemployment physical examinations.

An EKG technician attaches electrodes to a patient.

Many other cardiac tests are in use, including "invasive" tests such as cardiac catheterization and coronary angiography. During catheterization, a tube (catheter) is inserted through the patient's blood vessel into the heart. Angiography involves the injection of radiopaque dyes to enhance X-ray images (angiograms). Generally, the EKG is monitored during these other cardiac tests.

Since the equipment is mobile, EKG technicians can record electrocardiograms in a doctor's office, in the EKG department of a hospital, or at the patient's bedside. After explaining the procedure to the patient, the technician attaches from 3 to 12 electrodes—also called "leads"—to the chest, arms, and legs of the patient. Often the technician applies a gel between the electrodes and the patient's skin, to facilitate the passage of the electrical impulses. By manipulating switches on the electrocardiograph and positioning the electrodes across the chest, the technician traces the heart's electrical action. A stylus records the tracings on graph paper. The test may be given while the patient is resting or while exercising. The technician must know the anatomy of the chest and heart to select the exact locations for the chest electrodes. Electrodes placed in the wrong location result in an inaccurate reading.

After the recording has been completed, the technician prepares the electrocardiogram for analysis by a physician, usually a heart specialist. Technicians must be able to recognize and correct any technical errors, such as crossed wires or electrical interference, that prevent an accurate reading. They also must call the doctor's attention to any significant deviations from the norm for the technique used to record the EKG.

Some EKG technicians schedule appointments, type doctors' diagnoses, maintain patients' EKG files, care for equipment and assist in more specialized cardiac testing.

Working Conditions

Except for emergency cases, EKG technicians usually work in a relaxed atmosphere. A lot of their time is spent standing. They work directly with patients and therefore must relate to many kinds of people.

Technicians generally work a 5-day, 40-hour week, which may include Saturdays and Sundays. Those in hospitals also may work evening hours.

Employment

Electrocardiograph technicians held about 21,000 jobs in 1982. Most EKG technicians worked in cardiology departments of large hospitals. Others worked part time in small general hospitals where workloads are usually not great enough to demand full-time technicians. Some worked full or part time in clinics and cardiologists' offices.

Training, Other Qualifications, and Advancement

EKG technicians are trained on the job as a rule. Training usually is conducted by an EKG supervisor or a cardiologist and lasts from 4 to 6 weeks for basic EKG tests and up to 1 year for some of the more complex ones.

Applicants for trainee positions generally must be high school graduates. High school courses that are recommended for students interested in this field include health, biology, and typing. Familiarity with medical terminology can be acquired in classes on human anatomy and physiology and by studying a medical dictionary. Applicants for EKG training should be reliable, have mechanical aptitude, ability to follow detailed instructions, and presence of mind in emergencies.

The relatively few formal training programs in cardiovascular technology are located principally in hospitals, vocational-technical institutes, trade schools, and community colleges. Formal classroom programs range from 6 to 8 months. Two year associate degree programs have clinical as well as academic components. The American Cardiology Technologists Association (ACTA) recognizes five of these programs.

There are no licensing requirements for EKG technicians, and credentialing—available through the American Cardiology Technologists Association—is voluntary.

EKG technician is the entry level position in cardiovascular technology. With suitable experience and additional training, EKG technicians may advance to monitor technician, Holter monitor technician, stress testing technician, echocardiology technician, and cardiac catheterization technician. Promotion to a supervisory position is possible, too.

Job Outlook

Employment of EKG technicians is expected to grow faster than the average for all occupations through the mid-1990's as a result of general population growth, greater health consciousness, and the widespread availability of health insurance programs that help people pay for health and medical care. Demand for technicians also should increase due to the rising proportion of older persons, the segment of the population requiring the most cardiac testing. Most job openings, however, will result from the need to replace experienced EKG technicians who transfer to other kinds of work, leave the labor force temporarily, or stop working altogether.

Because entry requirements are minimal, the pool of prospective jobseekers is very large. In some communities, individuals seeking positions as EKG technicians may find that employers prefer applicants with previous EKG experience or formal training, including Armed Forces training.

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Earnings

EKG technicians employed in hospitals, medical schools, and medical centers earned starting salaries of about $11,000 a year in 1982, according to a survey conducted by the University of Texas Medical Branch. EKG technicians who perform more sophisticated tests generally are paid more than those who perform only basic ones. Some experienced EKG technicians earned as much as $22,300 a year.

EKG technicians employed by the Federal Government are called Medical Machine Technicians. Depending on their education and experience in this occupation, newly hired workers could earn annual salaries ranging from $11,949 to $18,339 in 1982. Usually, EKG technicians earn slightly less than the average for all nonsupervisory workers in private industry, except farming.

EKG technicians in hospitals receive the same fringe benefits as other hospital personnel, including health insurance, pension benefits, vacation, and sick leave. Some institutions provide tuition assistance, uniforms, and other benefits.

Related Occupations

Other occupations requiring operation of diagnostic or therapeutic equipment include audiometrists, electroencephalographic (EEG) technologists and technicians, radiologic technologists, and clinical laboratory technologists and technicians.

Sources of Additional Information

Local hospitals can supply information about employment opportunities.

For a list of approved training programs and information about credentialing, contact:

American Cardiology Technologists Association, Inc., Suite 808, Reston International Center, 11800 Sunrise Valley Dr., Reston, Va. 22091.

Electroencephalographic Technologists and Technicians

(D.O.T. 078.362-022)

Nature of the Work

Electroencephalography (EEG) is concerned with recording and studying the electrical activity of the brain. A machine called an electroencephalograph, operated by an EEG technologist or technician, records this activity and produces a written tracing of the brain's electrical impulses. This record of brain waves is called an electroencephalogram. Neurologists and other medical practitioners use electroencephalograms to help diagnose the extent of injury for patients suspected of having brain tumors, strokes, or epilepsy; to measure the effects of infectious diseases on the brain; and to determine whether individuals who suffer from serious adjustment problems or learning difficulties have any organic problems. EEG also may be used before vital organ transplant operations to help determine when the potential donor is "medically" dead.

Before EEG technicians and technologists produce electroencephalograms, they take a simplified medical history of the patient and help the patient relax. The technician then applies the electrodes of the electroencephalograph to designated spots on the patient's head and makes sure that the machine is working correctly. The technician chooses the most appropriate combinations of instrument controls and electrodes to produce the kind of record needed. EEG technicians must recognize and correct any artifacts that appear (an artifact is an electrical or mechanical event that comes from somewhere other than the brain, such as eye movement or interference from electrical lights). The technician reports any mechanical problems with the electroencephalograph to the supervisor, so that the machine can be repaired promptly. EEG technicians must know how to recognize changes in the patient's neurologic, cardiac, and respiratory status. To react properly in an emergency, EEG technicians must understand the kinds of medical emergencies that can occur while they are taking the electroencephalograph. For example, if a patient suffers an epileptic seizure, the EEG technician must take the proper action.

EEG technologists, who usually have a broader knowledge of the work than technicians, also use EEG equipment in conjunction with other electrophysiologic monitoring devices, such as tape recorders, computers, and video equipment. They also can repair the equipment. After producing an EEG recording, the technologist may be asked to write a description of the recording for the electroencephalographer.

Besides supervising technicians during recordings, EEG technologists arrange work schedules and teach EEG techniques. Technologists often have administrative responsibilities, such as managing the laboratory, keeping records, scheduling appointments, ordering supplies, and establishing protocol.

Working Conditions

EEG technologists and technicians, who usually work in clean, well-lighted surroundings, spend about half of their time on their feet. A lot of bending is necessary as they may work with patients who are unruly or very ill.

A 5-day, 40-hour workweek with little overtime is normal, although some hospitals require EEG technologists and technicians to be "on call" (ready to report to work at a moment's notice) after hours and on weekends and holidays. These employees generally work during the day, but those involved in sleep studies work evenings and nights.

Employment

Electroencephalographic technologists and technicians held about 5,500 jobs in 1982. Hospitals employ most EEG personnel. Jobs also are available in neurology laboratories and in the offices of neurologists and neurosurgeons. Most EEG technologists and technicians work full time.

Training, Other Qualifications, and Advancement

EEG technicians generally learn their skills on the job. Applicants for trainee positions in hospitals need a high school diploma, as a rule. Often, EEG trainees transfer to the neurology department from other jobs in the hospital, such as EKG technician.

EEG technologists qualify for their jobs in either of two ways: advancing from the technician level, or completing a formal training program. Programs that train EEG technologists are offered at the postsecondary level by hospitals, medical centers, community colleges, vocational-technical institutes, and colleges and universities. In 1980, the Committee on Allied Health Education and Accreditation (CAHEA) had approved 19 of the 53 formal training programs for EEG personnel. Programs usually last from 1 to 2 years and include laboratory experience as well as classroom instruction in neurology, anatomy, neuroanatomy, physiology, neurophysiology, clinical and internal medicine, psychiatry, and electronics and instrumentation. Graduates receive associate degrees or certificates.

Credentials for EEG personnel are available through the American Board of Registration of Electroencephalographic Technologists (ABRET), which awards the title "Registered EEG Technologist" (R. EEG T.) to qualified applicants. Although not generally required for entry-level jobs, registration indicates professional competence, and may be necessary for supervisory or teaching jobs.

Persons who want to enter this field should have manual dexterity, good vision, an aptitude for working with electronic equipment, and the ability to work with patients as well as with other health professionals. High school students considering a career in this occupation should take courses in health, biology, human anatomy, and mathematics.

Most EEG personnel work in hospitals.

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Some EEG technologists in large hospitals can advance to chief EEG technologist and take on increased responsibilities in laboratory management and in teaching basic techniques to new personnel or students from EEG training programs. Chief EEG technologists generally are supervised by a physician—an electroencephalographer, neurologist, or neurosurgeon.

Job Outlook

Employment of EEG technologists and technicians is expected to grow faster than the average for all occupations through the mid-1990's due to the increased use of EEG's in surgery, in diagnosing and monitoring patients with brain disease, and in research on the human brain. EEG technologists and technicians will also be needed to perform electrophysiological examinations—somatosensory, visual, and auditory evoked responses, for example—that have become more common as a result of advances in clinical neurophysiology. Contributing to the increased demand for EEG technologists and technicians is the projected expansion of the health industry that is associated with a growing and aging population and widespread access to health care through health insurance.

As in other occupations, however, most openings will arise from the need to replace workers who transfer to other jobs or stop working.

Earnings

Starting salaries of EEG technicians employed by hospitals, medical schools, and medical centers averaged $12,250 a year in 1982, according to a survey by the University of Texas Medical Branch. Starting salaries for registered EEG technologists were $1,000 to $2,000 higher. Top salaries of experienced EEG technicians ranged as high as $22,000 a year. Highly qualified technologists may earn more as teachers for special training, supervisors of EEG laboratories, or program directors of schools of EEG technology.

EEG technologists and technicians employed by the Federal Government are called Medical Machine Technicians. Depending on education and experience, beginning annual salaries ranged from about $12,000 to $18,400 in 1982.

EEG technologists and technicians in hospitals receive the same benefits as other hospital personnel, including hospitalization, vacation, and sick leave benefits. Some institutions provide tuition assistance or free courses, pension programs, uniforms, and parking.

Related Occupations

Related occupations in supervised medical activities are audiometrists, dental assistants, electrocardiograph technicians, electrodiagnostic technicians, licensed practical nurses, nursing aides, occupational therapy assistants, surgical technicians, orderlies, physical therapy aides, and psychiatric aides.

Sources of Additional Information

Local hospitals can supply information about employment opportunities.

For general information about a career in electroencephalography as well as a list of accredited formal training programs, contact:

Executive Office, American Society of EEG Technologists, Sixth at Quint, Carroll, Iowa 51401.

Information on becoming a registered EEG technologist is available from:

The Psychological Corporation, 304 E. 45th St., New York, N.Y. 10017.

Health Record Technicians

(D.O.T. 079.367-014)

Nature of the Work

A medical record is a permanent document giving a complete account of a person's illness or injury and the medical services rendered while in a health care facilty. Ordinarily, it includes such items as a patient's medical history, results of physical examinations, reports of X-ray and laboratory tests, diagnosis and treatment plan, doctors' orders and notes, and nurses' notes. This record shows at a glance what treatment has been given and what treatment is planned for the patient. Medical records also are used for research, insurance claims, legal actions, professional review of treatment and medications prescribed, and for training of medical personnel. In addition, medical records are used to evaluate the quality and cost of various medical and surgical procedures, and to plan health care in the community.

Managing an information system that meets the medical, administrative, ethical, and legal requirements of a health care delivery system involves the teamwork of *health record administrators*, *health record technicians*, and *health record clerks*. Often, these workers are referred to as medical record personnel.

Record administrators direct the activities of the health record department and develop systems for documenting, storing, and retrieving medical information. They supervise the medical record staff, and train them for specialized jobs. Administrators are responsible for compiling statistics for State or national health agencies, assist the medical staff in evaluations of patient care or research studies, and may be required to testify in court about records and record procedures. Health record administrators serving as department heads are a part of the hospital management staff.

Technicians organize and evaluate health records for completeness and accuracy. Using standard classification systems, they code symptoms, diseases, operations, procedures, and other therapies and post these codes on the records to facilitate retrieval of information at a later time.

Health record technicians prepare data for input into computers and also prepare records for microfilming. They assist the medical staff by tabulating data from records for research purposes and may, for example, maintain special registries showing occurrences of disease by type, such as cancer, injury, or stroke. Technicians also maintain health-record indexes and compile administrative and health statistics for public health officials, administrators, planners, and others.

In response to inquiries from law firms, insurance companies, and government agencies, health record technicians gather statistics and prepare reports on such topics as types of diseases treated, surgery, and use of hospital beds. They may present medical records during legal proceedings.

The day-to-day tasks of health record personnel vary with the size of the facility. For example, in a small health care facility, a record technician may have full responsibility for managing the record department, whereas in a large facility, technicians are likely to specialize in just one aspect of the work. In many nursing homes, a record clerk—working under a consultant who is a Registered Record Administrator (RRA) or an Accredited Record Technician (ART)—is responsible for maintaining the health record system.

Working Conditions

Health record personnel generally work a standard 40-hour week in a comfortable office environment within a hospital, nursing home, or other health care facility. Because incorrect or misplaced medical records could affect the health and well-being of a patient, close attention to detail is required. Some aspects of the job are highly repetitive.

Employment

Health record technicians held 22,000 jobs in 1982. Although most jobs are in hospitals, a growing number are located in nursing homes, clinics, community health centers, group practices, and health maintenance organizations. Insurance companies employ record technicians to tabulate and analyze data from medical records for evaluating claims for reimbursement. Public health departments hire technicians to supervise data collection from health care institutions and to assist in research. Manufacturers of medical record systems, services, and equipment employ health record personnel to develop and market their products.

Some record technicians provide services to nursing homes on a consultant basis. Other self-employed record technicians specialize in medical transcription—the typing of physicians' records and notes from dictating or recording equipment or, occasionally, from written notes.

Training, Other Qualifications, and Advancement

Most employers prefer to hire graduates of 2-year associate degree programs accredited by the Committee on Allied Health Education and Accreditation (CAHEA) of the American Medical Association in collaboration with the American Medical Record Association

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Record departments are likely to expand as hospitals increasingly monitor costs.

(AMRA). In 1982, community and junior colleges offered more than 80 accredited programs. Required courses include biological sciences, medical terminology, medical record science, business management, and data processing.

Credentialing of health record technicians is voluntary, and is offered through the American Medical Record Association (AMRA), which awards the title of Accredited Record Technician (ART) to those who pass a written examination.

Because the number of technician jobs outnumber graduates from approved programs, hospitals often advance promising record clerks to technician status through on-job-training. Medical record clerks with several years' experience can advance to the technician level after completing the AMRA Independent Study Program, obtaining 30 credit hours in medical record technology from an accredited college, and passing the ART examination for accreditation.

Job Outlook

Employment of health record technicians is expected to grow faster than the average for all occupations through the mid-1990's due to the health care needs of a growing and aging population. Most openings, however, will occur because of replacement needs.

Directly influencing demand for record personnel is the extensive paperwork associated with the delivery of health care—reports of diagnostic procedures, laboratory tests, and other clinical data needed for third-party payments, for professional review of decisions about patient care, and for regulatory purposes.

Management's need for accurate clinical data for purposes of financial control is the most important reason for anticipated employment growth in the years immediately ahead, however. Recently introduced changes in the method of health care financing are expected to heighten demand for record personnel to support management efforts to monitor and control costs. The introduction of prospective reimbursement for Medicare beneficiaries, for example, will give hospitals a reason to monitor patterns of diagnosis and treatment more closely than ever before—and this will require analysis of data maintained by health record technicians.

The outlook for technicians with a 2-year associate degree or its equivalent will be excellent through the mid-1990's. Health record technicians are likely to need this level of training as the documentation of medical care becomes more specialized and complex. For that reason, jobseekers without formal training may experience strong competition as health record technicians. Opportunities for part-time work will continue, especially in nursing homes.

Earnings

Earnings of health record technicians vary according to locality. Beginning technicians in hospitals and medical schools averaged $12,000 in 1982, according to a national survey conducted by the University of Texas. Experienced technicians in hospital record departments averaged about $16,500. Some earned over $19,000 a year.

In 1982, the 1,800 record technicians employed by the Federal Government averaged about $14,400 a year. Outstanding record technicians may work up to higher supervisory positions with corresponding pay increases, although Registered Record Administrators fill most positions.

Like other hospital employees, health record personnel generally receive paid holidays and vacations, health insurance, life insurance, and retirement benefits.

Related Occupations

Health record technicians perform a variety of technical and clerical duties including verification, transcription, and filing. Other workers with similar duties include information clerks, insurance clerks, library technical assistants, medical secretaries, and medical transcriptionists.

Sources of Additional Information

A list of CAHEA-approved programs for health record technicians, information about correspondence courses, and general information on careers in medical record management is available from:

American Medical Record Association, John Hancock Center, Suite 1850, 875 N. Michigan Ave., Chicago, Ill. 60611.

Licensed Practical Nurses

(D.O.T. 079.374-014)

Nature of the Work

Licensed practical nurses (LPN's) help care for the physically or mentally ill and infirm. Under the direction of physicians and registered nurses, they provide nursing care that requires technical knowledge but not the professional education and training of a registered nurse. (The work of registered nurses is described elsewhere in the *Handbook*.) In California and Texas, licensed practical nurses are called *licensed vocational nurses*.

In hospitals, LPN's provide bedside care. They take and record temperatures and blood pressures, change dressings, administer certain prescribed medicines, and help patients with bathing and other personal hygiene. They assist physicians and registered nurses in examining patients and in carrying out nursing procedures. They also assist in the delivery, care, and feeding of infants, as well as in the rehabilitation of patients. Some licensed practical nurses work in specialized units such as intensive care or recovery rooms. There they perform special nursing procedures and operate sophisticated equipment to provide care for seriously ill or injured patients. In some instances, experienced LPN's supervise hospital attendants and nursing aides.

LPN's who work in private homes provide day-to-day patient care that seldom involves highly technical procedures or complicated equipment. In addition to providing nursing care, they may prepare meals, see that patients are comfortable, and help keep up their morale. They may teach family members how to perform simple nursing tasks.

Working Conditions

Licensed practical nurses in hospitals generally work 40 hours a week, but often this includes some work at night and on weekends and holidays. They often must stand for long periods and help patients move in bed, stand, or walk.

In private homes, LPN's usually work 8 to 12 hours a day and go home at night. Private duty nursing affords a great deal of independence in setting work hours and the length and frequency of vacations.

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Employment

Licensed practical nurses held more than 594,000 jobs in 1982.

Well over half the wage and salary jobs were in hospitals, as the accompanying chart shows. A substantial number of jobs were in nursing homes, and the rest were in schools, clinics, and doctors' offices, for the most part.

An estimated 10 percent of LPN jobs are held by private duty nurses. These LPN's are either self-employed, in which case they are hired directly by patients or their families, or they are employees of a nurses' registry or temporary help agency. About 3 LPN's in 10 work part time.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require practical nurses to have a license. To become licensed, applicants must complete a State-approved program in practical nursing and pass a written examination. Educational requirements for enrollment in State-approved training programs range from completion of ninth grade to high school graduation, but a high school diploma is usually preferred.

In 1982, about 1,300 State-approved programs provided practical nursing training. Trade, technical, or vocational schools offered more than half of these programs. Other programs were available at community and junior colleges, hospitals, and health agencies. Several programs operated by the Armed Forces for military personnel were State-approved for practical nurse training. Graduates of these programs can apply for licensure.

Practical nurse training programs generally last 1 year and include both classroom study and clinical practice. Classroom instruction covers nursing concepts and principles and related subjects including anatomy, physiology, medical-surgical nursing, pediatrics, obstetrics, psychiatric nursing, administration of drugs, nutrition, first aid, and community health. In addition, students receive supervised clinical experience—usually in a hospital.

LPN's should have a deep regard for human welfare and be emotionally stable because work with the sick and injured can be upsetting. As part of a health care team, they must be able to follow orders and work under close supervision.

Licensed practical nurses must be sensitive to the needs of patients.

Advancement opportunities are limited, although in-service educational programs prepare some LPN's for work in specialized areas, such as postsurgery recovery rooms or intensive care units.

Increasingly, however, practical nurse training programs are designed to allow practical nurse graduates to continue their education and eventually satisfy the formal requirements for registered nurse. For example, in over 80 associate degree RN programs, the first year of study satisfies the educational requirements for LPN. After this first year of study, students can apply for licensure as a practical nurse and begin working, or complete both years of coursework and seek licensure as a registered nurse.

Job Outlook

Employment of LPN's is expected to rise faster than the average for all occupations through the mid-1990's in response to the health care needs of a growing and aging population.

As in most other occupations, replacement needs will be the main source of jobs, despite the fact that LPN's show an unusually strong attachment to their field. Compared to workers in other occupations requiring a similar amount of training, LPN's are much less likely to transfer to other jobs. Individuals who stop working as practical nurses tend to stop working altogether; most resume homemaking responsibilities. LPN's not currently active in the field thus augment the supply of approximately 40,000-45,000 persons who complete formal training programs each year.

The acute care, high technology emphasis of American medicine has had the effect, over the past decade, of restraining employment growth in practical nursing. The widespread adoption of sophisticated medical technologies—a concept that includes diagnostic and therapeutic procedures as well as equipment—has produced a demand for highly skilled support staff. Registered nurses, physician assistants, and technologists are sought for the advanced training these positions generally require.

In academic medical centers, teaching hospitals, and other institutions where the most advanced technology is in place, LPN's are being phased out and replaced by registered nurses. This trend could accelerate if changes in the health care delivery system lead to changes in the mix of hospital patients. Specifically, the emergence of "alternative" delivery systems such as walk-in surgical centers and clinics that handle less serious medical problems could mean that a larger proportion of hospital beds will be occupied by the sickest patients, whose conditions require the application of sophisticated technologies.

While a number of factors affect future prospects for LPN's, efforts to restrain the increase in health care costs are particularly important. Changes in the health care financing system are likely to produce organizational changes in the years ahead, including shifts in staffing patterns in hospitals and nursing homes. In some hospitals, fewer LPN's and nursing aides will be used, but in others, little change in the mix of nursing personnel is anticipated.

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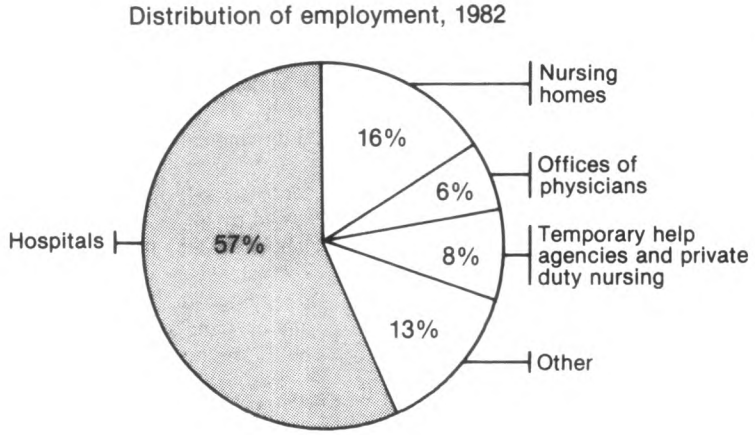
More than half of all licensed practical nurses work in hospitals.



SOURCE: Bureau of Labor Statistics

Employment opportunities for LPN's are expected to be more favorable in some settings than in others. Prospects will be excellent in nursing homes, home health agencies, and private duty nursing—practice settings where the number of LPN jobs is expected to grow rapidly through the mid-1990's. Fewer opportunities are foreseen in other fast-growing settings: Health maintenance organizations, clinics, and free-standing emergency centers will probably hire registered nurses instead.

Nearly half of all new jobs for LPN's will be in the hospital sector.

Earnings

Median annual earnings of LPN's who worked full time in 1982 were about $13,000. The middle 50 percent earned between $11,000 and $16,000. The lowest 10 percent earned $8,000 or less. The top 10 percent earned more than $18,000.

According to surveys conducted by the Bureau of Labor Statistics, LPN's employed full time in nursing homes in large metropolitan areas earned annual salaries ranging from $11,000 to $18,000 in 1982. Full-time LPN's in hospitals in large metropolitan areas earned from $13,000 to $19,000.

Starting salaries of LPN's employed in hospitals, medical schools, and medical centers averaged about $12,700 a year in 1982, according to a national survey conducted by the University of Texas Medical Branch. Experienced LPN's averaged about $16,600.

In 1982, Federal hospitals paid LPN's with no experience annual salaries of $10,645. LPN's with 1 year of experience received $11,949 and those with 2 years, $13,369.

Many hospitals give pay increases after specific periods of satisfactory service. Paid holidays and vacations, health insurance, and pension plans are typical benefits provided by hospitals.

Related Occupations

Other jobs that involve working closely with people while helping them include: Emergency medical technician, social service aide, and teacher aide.

Sources of Additional Information

A list of State-approved training programs and information about practical nursing is available from:

National League for Nursing, 10 Columbus Circle, New York, N.Y. 10019.

National Association for Practical Nurse Education and Service, Inc., 254 West 31st St., New York, N.Y. 10001.

For information about a career in practical nursing, contact:

National Federation of Licensed Practical Nurses, Inc., P.O. Box 11038, Durham, N.C. 27703.

Information about employment opportunities in Veterans Administration hospitals is available from local Veterans Administration hospitals and also from:

Recruitment Division, Veterans Administration, 810 Vermont Ave. NW., Washington, D.C. 20420.

For information on nursing careers in hospitals, contact:

American Hospital Association, Division of Nursing, 840 North Lake Shore Dr., Chicago, Ill. 60611.

For a copy of "Health Careers in Long-Term Care," write:

American Health Care Association, 1200 15th St. NW., Washington, D.C. 20005.

Radiologic Technologists

(D.O.T. 078.161-018, .162-010, .361-018 and -034, .362-026 and .364-010)

Nature of the Work

The field of radiology had its beginnings in 1895, when Wilhelm Roentgen discovered X-rays, which permit a physician to view the interior of the human body and diagnose conditions such as fractures, ulcers, blood clots, and tumors. With the application of computer technology to radiology during the 1970's, the field has been revolutionized. Today, the chances of obtaining an accurate diagnosis are vastly improved as vague symptoms are routinely transformed into sharp, clear pictures. Sophisticated computer imaging devices can screen nonsurgically for disorders, often on an outpatient basis. This means less risk for the patient than in the past, when there often was no alternative to invasive tests and exploratory surgery.

New applications of radioisotopes and radioactive tracers led to the growth of nuclear medicine, while the invention of therapeutic X-ray machines led to the birth of radiation therapy, also known as radiation oncology. More recently, advances in computer technology have made possible such imaging systems as computed tomography, ultrasound, and digital subtraction angiography, all of which provide physicians with a good "look" at internal organs with little risk to the patient. Although discovered many years ago, some of these imaging techniques have become clinically practical only during the last decade, thanks to improvements in electronic circuitry that enable computers to handle the vast amount of data involved in a single test. Imaging systems coming into use include nuclear magnetic resonance and positron emission tomography.

The people who operate radiologic equipment are called radiologic technologists or radiographers. They should not be confused with radiologists—physicians who specialize in the interpretation of radiographs.

Most technologists operate equipment that is used for diagnostic imaging: X-ray machines, fluoroscopes, computed tomography (CT) scanners, and ultrasonic scanners, for example. These workers are still known as X-ray technologists in some places. However, as imaging technologies based on concepts other than X-ray exposure have come into use, *radiologic technologist* or *radiographer* has become the standard job title. Radiation is now an important tool for the treatment of disease as well as for diagnosis, and a distinction frequently is drawn between *therapeutic radiologic technologists* and *diagnostic radiologic technologists*. The emergence of nuclear medicine, radiation therapy, and ultrasound as separate specialties has created additional job titles.

Before a radiologic technologist can perform any work on a patient, a physician must issue a requisition for the work. Similar to prescriptions for drugs, these requisitions assure that radiologic technologists examine or treat only people certified by physicians as needing such studies or treatment. At all times, technologists must follow precisely not only physicians' instructions but also regulations concerning use of radiation to insure that they, patients, and coworkers are protected from its dangers.

Because radiologic technologists often work with patients who cannot help themselves, good health, moderate strength, and stamina are important. A sympathetic and understanding manner is helpful, for technologists need to

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give clear instructions and explanations to patients who often are worried and anxious. Patients may be very ill or dying. Radiation therapy technologists in particular are called upon to develop a close and compassionate relationship with patients and their families, for in contrast to the pattern in other areas of radiology, these technologists are likely to administer therapy to cancer patients every day for several weeks or more. In radiation therapy, nuclear medicine, and even ultrasound, it is not uncommon for patients to have breathing difficulties or to go into shock or cardiac arrest; if this happens, the technologist must be ready to assist until other medical personnel can be called in.

Radiologic technologists (D.O.T. 078.362-026) take X-ray films (radiographs) of all parts of the human body for use in diagnosing medical problems. They prepare patients for radiologic examinations, assuring that they remove any articles, such as belt buckles or jewelry, through which X-rays cannot pass. Then they position the patients, who either lie on a table, sit, or stand, so that the correct parts of the body can be radiographed, always taking care not to aggravate injuries or make the patients uncomfortable. To prevent unnecessary radiation exposure, the technologist surrounds the exposed area with radiation protection devices, such as lead shields, or in some way limits the size of the X-ray beam.

After the necessary preparations, the technologist positions the radiation equipment at the correct angle and height over the appropriate area of a patient's body. Using instruments similar to a measuring tape, the technologist measures the thickness of the section to be radiographed and then sets the controls on the machine to produce radiographs of the right density, detail, and contrast. The technologist then places a properly identified X-ray film of the correct size under the part of the patient's body to be examined, and makes the exposure. Afterward, the technologist removes the film and develops it. Throughout the procedure, the technologist is careful to use only as much radiation as is necessary to obtain a good diagnostic examination.

Before a radiologist examines a patient by fluoroscopy (watching a patient's internal body movements on a monitor or screen), the radiologic technologist prepares a solution of barium sulphate for the patient to drink. As this solution passes through the patient's digestive tract, for example, the radiologist looks for diseases, injuries, or defects in the patient's digestive system. When fluoroscopic examinations are performed, whether on the digestive tract or on other parts of the body such as chest, heart, or blood vessels, the technologist assists the physician by preparing and positioning the patient, adjusting the machine, applying the correct exposure, and making any necessary follow-up radiographs.

Nuclear medicine technologists (D.O.T. 078.361-018), also known as radioisotope technologists, participate in or direct various activities involving radiopharmaceuticals in medical diagnosis and treatment. They may work directly with patients; conduct laboratory studies; do research; or handle administrative functions relating to the purchase, use, and disposal of radioactive isotopes and safety procedures required in using them.

Nuclear medicine technologists calculate and prepare the correct dosages of radionuclides or radiopharmaceuticals given to patients by mouth, injection, or other means and then position the patient for the imaging procedures. Using special equipment, technologists make images of the radioistopes or radionuclides as they pass through or localize in different parts of a patient's body. They view images on a screen or on films to detect the existence of pathologic conditions, which are determined by the distribution of radioactive isotopes in various organs, glands, and body systems. This information is used by physicians in diagnosis. Small quantities of radioactive isotopes may be administered to a patient, and body specimens, such as blood and urine, collected and measured for radioactivity level. Radioactive substances may also be added to body specimens to determine hormone and drug content.

Other responsibilities include insuring that radiation safety procedures are carefully followed by all workers in the nuclear medicine laboratory and that complete and accurate records are kept. This includes patient medical records, patient procedures performed, and amounts and kinds of radioisotopes received, used, and disposed of.

Radiation therapy technologists (D.O.T. 078.361-034) treat cancer patients. They prepare patients for radiotherapy and administer prescribed doses of ionizing radiation to diseased body areas. Technologists operate various kinds of equipment, including high energy linear accelerators and particle generators. They must position patients under the equipment with absolute accuracy, in order to expose diseased body areas to treatment while protecting the rest of the body from radiation.

Radiation therapy produces side effects such as nausea and vomiting, hair loss, and redness of the skin in the exposed area, so the technologist must observe the patient's reactions and keep the physician informed.

Other responsibilities include assisting in maintaining the proper operation of controlling devices and equipment, observing safety measures for patients and clinical personnel, and keeping or helping keep patient records, as well as assisting in the preparation and handling of radioactive materials used in treatment procedures.

With additional education, available at major cancer centers, radiation therapy technologists can specialize and become medical radiation dosimetrists. In this specialty, they work with health physicists in determining the best radiation dosages for various problems as well as the special devices needed to expose only a small section of a body part to radiation.

Ultrasound technologists (D.O.T. 078.364-010), also known as diagnostic medical sonographers, use special equipment to transmit sound waves at high frequencies into the patient's body, then collect reflected echoes to form an image. The image, which results from the "bounce-back" of sound from the areas being scanned, is viewed on a screen and may be automatically recorded on a printout strip or photographed from the screen for permanent records and for use in interpretation and diagnosis by physicians. Ultrasound images can be displayed as moving pictures—an important feature for cardiovascular and prenatal studies. Ultrasound has quickly become a mainstay in obstetrics and gynecology, and is coming into widespread use in other clinical areas as well.

Ultrasound technologists select equipment appropriate for use in ultrasound tests ordered by physicians. They also check the patient's other diagnostic studies for information.

An X-ray is an important diagnostic tool.

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Sonographers explain the procedure, record any additional medical history considered necessary, and then position the patient for testing. Viewing the screen as the scanning device is moved over the patient's body, sonographers must be able to recognize subtle differences between healthy and pathological areas, to check for factors such as position, obstruction, or change of shape; and to judge if the images are satisfactory for diagnostic purposes. A high degree of technical skill and knowledge of anatomy and physiology are essential to recognize the significance of all body structures present in the ultrasound image.

In addition to the duties involved in preparing patients and operating equipment, technologists may have administrative tasks. They may prepare work schedules, evaluate equipment, and, in general, manage ultrasound departments or facilities.

Working Conditions

Radiologic technologists generally work a 40-hour week that may include evening and weekend or on-call hours. Technologists are on their feet a lot and may be required to lift or turn disabled patients.

There are potential radiation hazards in this field; however, these hazards have been reduced by the use of safety devices such as instruments that measure radiation exposure, lead aprons, gloves, and other shielding. Because of the presence of radiation and radioactive materials, technologists wear special badges while they are in the radiation area. The badge measurement rarely approaches or exceeds established safety levels because of safety programs and built-in safety devices.

Radiologic technologists, radiation therapy technologists, and nuclear medicine technologists are among the occupations covered by the Consumer Patient Radiation Health and Safety Act of 1981, which aims to protect the public from the hazards of unnecessary exposure to medical and dental radiation by making sure that operators of radiologic equipment are properly trained. The Act requires the Federal Government to set standards that the States, in turn, may use for accrediting training programs and certifying individuals who engage in medical or dental radiography.

Employment

Radiologic technologists held about 110,000 jobs in 1982. Most were diagnostic radiographers. Nuclear medicine technologists, radiation therapy technologists, and ultrasound technologists hold a relatively small proportion of all jobs in this field.

About 7 out of every 10 jobs are in hospitals. The rest are located in physicians' and dentists' offices, clinics, and laboratories. About 2,500 radiologic technologists worked for the Veterans Administration in 1982: these included 2,100 diagnostic radiographers, 300 nuclear medicine technologists, and fewer than 100 radiation therapy technologists.

Many technologists work part time.

Training, Other Qualifications, and Advancement

Preparation for this field is offered at the postsecondary level in hospitals, medical centers, colleges and universities, trade schools, vocational-technical institutes, and the Armed Forces. Hospitals, which employ most radiologic technologists, prefer to hire individuals who have completed a formal training program. Technologists employed in physicians' offices may be trained on the job, however.

Formal training programs are offered in radiography, nuclear medicine technology, radiation therapy technology, and diagnostic medical sonongraphy (ultrasound). These programs vary in a number of respects: Length of training, prerequisities, class size, and cost. Programs range in length from 1 to 4 years and lead to a certificate, associate degree, or bachelor's degree. Two year programs are most prevalent, however.

Some of the 1-year certificate programs are designed for individuals from other health professions who wish to change fields—medical technologists, registered nurses, and respiratory therapists, for example. Certificate programs also attract radiologic technologists interested in developing a specialization in nuclear medicine, radiation therapy, or ultrasound technology. A bachelor's or master's degree in one of the radiologic technologies is desirable for supervisory, administrative, or teaching positions.

The Committee on Allied Health Education and Accreditation (CAHEA) accredits most formal training programs for this field. A total of 8,300 persons graduated from approximately 1,000 CAHEA-accredited programs in 1982: 7,200 in radiography, 700 in nuclear medicine technology, and 400 in radiation therapy technology. (Ultrasound programs were not accredited by CAHEA until 1982, so most of the 100 or so programs in diagnostic medical sonography are not yet accredited.)

Radiography programs require, at a minimum, a high school diploma or the equivalent. High school courses in mathematics, physics, chemistry, and biology are helpful. The programs provide both classroom and clinical instruction in anatomy, physiology, patient care procedures, physics, radiation protection, principles of imaging, medical terminology, positioning, medical ethics, radiobiology, and pathology.

While it is difficult to generalize about prerequisities for training programs in nuclear medicine, radiation therapy, and diagnostic medical sonography, a health professions background generally is preferred. For some programs, it is essential. About half of the CAHEA-accredited radiation therapy programs, and several of the diagnostic medical sonography programs, accept applications only from radiologic technologists and registered nurses. Nuclear medicine technology programs accept medical laboratory technologists as well as radiologic technologists and nurses. Nuclear medicine programs that do not require a health professions background generally expect applicants to have 2-3 years of college; many require a bachelor's degree.

Procedures for professional credentialing of radiologic occupations include licensure—required by law in 12 States and Puerto Rico—and certification or registration, which is voluntary. Many jobs are open only to registered or registry-eligible technologists. Hospitals, for example, generally require CAHEA-accredited training plus credentials in the appropriate radiologic technology. Public health departments and private physicians are more likely to hire technologists without such credentials.

States that currently license radiographers are: Arizona, California, Florida, Hawaii, Indiana, Kentucky, Montana, New Jersey, New York, Oregon, Vermont, and West Virginia. Radiation therapy technologists must hold a license in order to work in 6 States: Arizona, California, New Jersey, New York, Oregon, and Vermont. New Jersey and Vermont require nuclear medicine technologists to be licensed. (Puerto Rico requires a license for the practice of all three specialties: Radiography, radiation therapy technology, and nuclear medicine technology.)

Registration is offered by the American Registry of Radiologic Technologists (ARRT) in three technologies: Radiography, radiation therapy, and nuclear medicine. Credentials in nuclear medicine technology are also awarded by the Nuclear Medicine Technology Certification Board (NMTCB). The American Registry of Diagnostic Medical Sonographers (ARDMS) certifies the competence of ultrasound technologists.

With experience and additional training, staff technologists in large radiography departments may be promoted to positions that require advanced skills in special procedures including CT scanning, ultrasound, and angiography, or they may move into supervisory positions such as quality assurance technologist, chief technologist, and—ultimately—department administrator or manager. Some technologists progress by becoming instructors or directors in radiologic technology programs; others take jobs as sales representatives or instructors with equipment manufacturers.

Job Outlook

Employment in the field of radiologic technology is expected to grow faster than the average for all occupations through the mid-1990's, reflecting the importance of these technologies in the diagnosis and treatment of disease. Nonetheless, most openings will come from the need to replace experienced technologists who leave the profession.

Most radiologic technologists are young women, and the field is characterized by a pattern of movement from family responsibilities into the labor force and back to the home again. Technologists who leave the occupation generally do so in order to go to school or assume household responsibilities; relatively few transfer to other occupations and fewer still remain in the field until they are old enough to retire.

While job prospects for radiologic technologists are expected to be good, overall, there are problems of maldistribution. Supply and

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demand appear to be in balance in major metropolitan areas, but rural communities have difficulty recruiting and retaining qualified staff. As a result, hiring practices vary according to the availability of trained personnel. In small towns and rural areas, nurses, clinical laboratory technologists, and other health professionals may be taught to operate radiologic equipment if trained technologists are not available. This rarely happens in suburban areas and large cities.

Opportunities for radiation therapy technologists should should continue to be excellent, although it is important to bear in mind that this specialty is very small. Currently, radiation therapy technologists are in great demand, and reports of a shortage are widespread. Trends in the incidence of cancer and other malignancies will continue to be the principal factor affecting demand for these workers. Not only has there been an increase in the number of cancer cases detected, but more cases are being treated by radiation—either alone or in combination with surgery or chemotherapy.

In nuclear medicine, demand is likely to grow in emerging specializations such as nuclear magnetic resonance (NMR) technology. NMR represents a new generation in medical diagnostics and is a potential competitor with computed tomography (CT) for the diagnosis of brain, brain stem, and spinal cord cases because it provides very effective imaging of soft tissues. NMR equipment employs huge superconductive magnets and radiowaves to reveal detailed information about the body's anatomy and chemical composition. The information is processed by a computer and the resulting image displayed on a videoscreen in a control room. While some analysts believe NMR will be a "boom technology," it is difficult to predict how rapidly the new, extremely expensive equipment will be put into place.

Efforts to bring health care spending under control could affect radiology. Recent changes in the health care financing system may encourage hospitals to reduce the use of diagnostic radiology services, and to be more cautious about approving outlays for costly new technology and equipment. Steps such as these might cause employment to grow less rapidly than currently anticipated. However, it is too soon to predict the employment impact of cost containment efforts; the effect on radiologic technologists remains to be seen.

Long term prospects for radiologic technologists will also be influenced by future trends in enrollments in formal training programs, which are expected to level off or possibly decline during the 1980's due to the sharp decrease in the population of college age. A stable or somewhat smaller supply of newly qualified technologists, coupled with rapidly growing demand, would create a highly favorable situation for jobseekers.

Earnings

Starting salaries of radiologic technologists employed in hospitals, medical schools, and medical centers averaged about $14,900 a year in 1982, according to a national survey conducted by the University of Texas Medical Branch. Experienced radiologic technologists averaged about $19,300 a year.

Workers with specialized skills earn more. Ultrasound technologists started at about $16,400 in 1982, according to the University of Texas survey; radiation therapy technologists, at about $16,700; and nuclear medicine technologists, at $17,000 a year. Experienced ultrasound technologists averaged $20,500 a year. Experienced radiation therapy technologists also averaged $20,500, and experienced nuclear medicine technologists earned somewhat more—$21,400 a year, on the average.

In 1982, the Federal Government offered salaries of about $13,000 a year to radiologic technologists in entry level positions. Average Federal salaries in 1982 were about $17,000 a year for diagnostic radiologic technologists, $18,200 for radiation therapy technologists, and $18,400 for nuclear medicine technologists.

Sick leave, vacations, health insurance, and other benefits are comparable to those covering other workers in the same organization.

Related Occupations

Radiologic technologists operate sophisticated technical equipment to help physicians, dentists, and other health practitioners diagnose and treat patients. Workers in related occupations include dental hygienists, electrocardiograph technicians, electroencephalographic technologists, and clinical laboratory technologists.

Sources of Additional Information

For career information, enclose a stamped, self-addressed business size envelope with your request to:

American Society of Radiologic Technologists, 15000 Central Ave. SE, Albuquerque, N. Mex. 87123.

Society of Nuclear Medicine, 475 Park Avenue South, New York, N.Y. 10016.

Society of Diagnostic Medical Sonographers, P.O. Box 31782, Dallas, Tex. 75231.

Information about a career in radiation therapy technology is available from:

Vice President for Professional Education, American Cancer Society, 777 Third Ave., New York, N.Y. 10017.

For the current list of accredited training programs in radiography, radiation therapy technology, nuclear medicine technology, or diagnostic medical sonography, write:

Department of Allied Health Education and Accreditation, American Medical Association, 535 N. Dearborn St., Chicago, Ill. 60610.

Surgical Technicians

(D.O.T. 079.374-022)

Nature of the Work

Surgical technicians, also called surgical technologists or operating room technicians, assist surgeons and anesthesiologists before, during, and after surgery. They work under the supervision of physicians and registered nurses.

They help set up the operating room with the instruments, equipment, sterile linens, and fluids such as glucose that will be needed during an operation. Surgical technicians also may prepare patients for surgery by washing, shaving, and disinfecting body areas where the surgeon will operate. They may transport patients to the operating room and help drape and position them on the operating table.

During surgery, they pass instruments and other sterile supplies to the surgeons and the surgeons' assistants. They hold retractors, cut sutures, and help count the sponges, needles, and instruments used during the operation. Surgical technicians help prepare, care for, and dispose of specimens taken for testing during the operation and help apply dressings. They may operate sterilizers, lights, suction machines, and assist with diagnostic equipment.

After the operation, surgical technicians help transfer patients to the recovery room and assist nurses in cleaning and stocking the operating room for the next operation.

Working Conditions

Surgical technicians work in clean, well-lighted, cool environments. They need stamina to be on their feet the whole time they are on duty and to pay close attention during operations.

Most surgery is performed during the day, but some workplaces, such as emergency surgery units, require 24-hour coverage. A 40-hour, 5-day workweek is normal for surgical technicians, although many are required at times to be "on call" (available to work on short notice for emergencies).

Employment

Surgical technicians held about 35,000 jobs in 1982. Although some surgical technicians—called private scrubs—are employed directly by surgeons, most are employed by hospitals, clinics, surgical centers, and other institutions that have operating room, delivery room, and emergency room facilities.

Training, Other Qualifications, and Advancement

Nearly all technicians receive their training in formal programs offered by community and junior colleges, vocational and technical schools, or hospitals. Although most programs last from 9 to 10 months, some community college programs last 2 years and lead to an associate degree. In 1983, there were about 400 training programs for surgical technicians, of which 101 were accredited by the Committee on Allied Health Education and Accreditation (CAHEA). High school graduation normally is required for admission.

Accredited programs provide classroom training as well as supervised clinical experience. Required courses include anatomy, physiology, and microbiology. Other courses include the care and safety of patients during surgery, use of anesthesia and its hazards, and surgical procedures. Students also learn how to

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sterilize instruments; prevent and control infection; and handle special drugs, solutions, supplies, and equipment.

Some surgical technicians receive their training in hospital-based programs for students who have a background in allied health fields. The length of these programs varies from 6 weeks to 1 year, depending on the trainee's qualifications and the objectives of the training. Students in these programs include practical nurses, nursing aides, clinical laboratory aides, radiology technicians, and emergency medical technicians.

Some surgical technicians are trained in the Armed Forces. Regardless of where they are trained, surgical technicians are expected to keep abreast of new developments in the field, such as laser surgery, so they can work with the new equipment and procedures.

Obtaining professional credentials for this occupation is voluntary; the Liaison Council on Certification (LCC) certifies technicians who meet entry level knowledge by successfully passing a national certification examination. Continuing education is required to maintain the certification.

Manual dexterity is a necessity for surgical technicians because they must handle various instruments quickly. They must be conscientious, orderly, and emotionally stable. In surgery, there is very little margin for error. High school students interested in careers in this occupation are advised to take courses in health and biology.

Some surgical technicians advance to assistant operating room administrator and assistant operating room supervisor. Operating room administrators deal with the day-to-day running of an operating room, including ordering supplies and arranging work schedules, while operating room supervisors direct the work of other surgical technicians.

A surgical technician prepares a syringe.

Job Outlook

Employment in this field is expected to grow faster than the average for all occupations through the mid-1990's. As in other occupations, however, most job openings will result from the need to replace experienced workers who transfer to other occupations or stop working altogether.

The same factors that generate strong demand for other health workers will also spur demand for surgical technicians—namely, population growth, the aging of the population, technological advances that make surgery appropriate in more situations than before, and the availability of health insurance programs that help people pay for medical and surgical care.

Also contributing to the growth in demand for workers in this small occupation is an expansion in their role. Surgical technicians in some hospitals are performing more of the routine operating room tasks previously handled by operating room nurses.

The rate of surgery has increased in recent years, particularly among persons 65 years of age and older. The increase in surgery among the elderly may result in part from technological advances that make surgical procedures safer and more effective, so that the potential benefits to the elderly patient outweigh the risks. If this trend continues, demand for surgical technicians will be heightened.

Graduates of formal training programs or surgical technicians with certification will have the best job opportunities. Persons without these qualifications can expect to face competition for jobs of their choice.

Earnings

The average starting salary for surgical technicians was about $12,200 a year in 1982, according to a national survey conducted by the University of Texas Medical Branch. Experienced technicians earned an average salary of approximately $15,800 annually. Surgical technicians employed by the Federal Government are classified as Operating Room Nursing Assistants. Starting salaries ranged from about $9,800 to $18,400 in 1982, depending on education and experience.

Salaries vary widely by geographic location, with those on the east and west coasts generally higher. Surgical technicians employed by surgeons tend to earn more than those employed by hospitals and similar institutions.

Related Occupations

Other workers who perform medical activities under supervision are chiropractor assistants, dental assistants, electrocardiograph technicians, electroencephalographic technologists and technicians, licensed practical nurses, medical assistants, nursing aides, occupational therapy assistants, orderlies, and physical therapy aides.

Sources of Additional Information

Additional information on a career as a surgical technician, on training programs for the occupation, and on certification is available from:

Association of Surgical Technologists, Caller No. E, Littleton, Colo. 80120.

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Writers, Artists, and Entertainers

Creativity, imagination, and talent are prerequisites for a career as a writer, artist, or entertainer. People in these fields use a variety of media to express ideas and emotions and to describe and interpret the human experience.

For writers and others in communication occupations, language is a "tool of the trade." They use the written or spoken word to inform, persuade, or entertain—or to express their own individuality. Poets, playwrights, lyricists, novelists, and short-story writers use language primarily for creative expression. Among those who use language to inform or persuade are journalists, speechwriters, script writers, technical writers and copywriters. Some people in communications occupations do relatively little writing. Among them are editors, who revise and coordinate the work of others; proofreaders, who read and correct copy; literary agents, who appraise and try to get manuscripts published; and radio and television announcers and interpreters who rely on the spoken word to do their jobs.

Artists and others in design occupations use visual means such as light, space, color, form, and texture to convey feelings or create a particular effect. They need esthetic sensitivity, color sense, and talent. A fine artist creates a painting or sculpture primarily to express an emotion or idea. Applied artists create esthetically pleasing objects that serve a practical purpose. Working by hand, for the most part, they employ artistic skills and techniques to produce utilitarian objects. The design field includes people as diverse as sculptors, graphic and commercial artists, sign painters, illustrators, photographers, engravers, painting restorers, prop makers, silversmiths, decorators, exhibit designers, clothing designers, and furniture designers.

Performing artists and entertainers express themselves through music, drama, dance or movement. Whereas writers and visual artists can capture a moment forever by transferring it to paper or canvas, performing artists express their creativity through a "performance." And no two live performances are ever exactly the same. Performing artists may use their talent to say something serious or profound about the human condition or they may simply provide entertainment. Because communicating with an audience is such an integral part of the performer's art, stage presence and rapport with an audience are qualities an artist must develop and refine. Actors and actresses, singers, dancers, musicians, comedians, magicians, mimes, trapeze artists, and figure skaters are just a few of the many different entertainment occupations.

In some of these occupations, particularly those in the performing arts, few jobs offer permanent employment; most are short-term engagements. With an oversupply of qualified people vying for work, many writers, artists, and entertainers have to settle for occasional or part-time employment in their chosen field. They work for pay when they can. The rest of the time, they study, practice, and take temporary jobs unrelated to their art—such as waiting on tables or sales clerking.

People who aspire to a creative career need to be realistic about their talent, for that is what counts most in getting a job or establishing a reputation. Practical experience—in local theatrical productions or on a community newspaper, for example—can help in getting started. However, even very talented people must be willing to spend years mastering a skill and then wait for a "break"—an opportunity to perform, to exhibit their work, or to have a manuscript published. Writers, artists, and entertainers need to be flexible enough to cope with job insecurity and willing to live on an irregular income. Job prospects in a number of creative occupations are described in the statements that follow.

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Communications Occupations

The art of communications is as old as humanity. Its importance in modern society becomes apparent when you try to imagine the world without radio, television, newspapers, magazines, or books. From the earliest discoveries of papermaking techniques to today's use of computers and satellites that transmit information around the world instantaneously, people have sought ways of recording the events around them and conveying the information to others. Communication is the process of transmiting information to an audience through a variety of media.

The communications field includes a broad range of occupations having to do with research, writing, editing, and production. It encompasses educational, medical, business, speech, joke, screen, and fiction writing; and interpreting, translating, public relations, advertising, and many other specialties. This section of the *Handbook* describes four of these occupations—reporters and correspondents, public relations workers, radio and television announcers and newscasters, and writers and editors.

Communications occupations require a broad education, with preparation either in the liberal arts and humanities or in a scientific or technical field, depending on specific career interest. The intellectual habits acquired during college are important. Acute powers of observation and the ability to think clearly and logically are necessary traits, because people in these jobs need to understand the significance of the events they observe. An excellent command of language—both written and oral—is essential. It is through appropriate choice of words or phrases that writers, for example, get the desired effect from their material. A feeling for language enables reporters and correspondents to breathe life and meaning into events that occur every day. A knack for dramatization through the spoken word makes radio and television announcers and newscasters attractive to audiences of all kinds.

In addition to a broad education and outstanding language skills, people in communications jobs may need to be very well informed about a particular subject. Depending on the job, they may need to be versed in economics, law, politics, science, engineering, computer science, education, music, or sports. They may be called upon to explain complex legal issues that arise from a major Supreme Court decision; national economic and political events for readers of a small town newspaper; the latest developments in a high-technology field for readers of a trade journal; or the history of jazz, classical, bluegrass, or other music featured on a radio show.

Many communications workers must perform well under pressure. A reporter who misses the deadline on an important story may cost the newspaper a "scoop," resulting in a loss of newsstand sales. A television announcer who does not react quickly to emergencies on the air can cause the show's ratings to decline. A public relations worker who gives out incorrect information about a company's operations can damage its public image.

Competition for most communications jobs is keen because the field traditionally attracts many more jobseekers than there are job openings. Some people are attracted by the glamorous image of media jobs—the opportunities to meet public figures, to appear before nationwide audiences, and to attend top newsmaking events. This glamorous aspect of the job obscures the hard work most of these jobs entail. Journalists, for example, spend hours every day on the tedious but essential tasks of making contacts, checking facts, following leads, and writing up their findings.

Despite the keen competition, jobs will be available through the mid-1990's for talented people who have acquired appropriate education and experience. Willingness to take a job where one is available in a small town instead of Los Angeles or New York City and willingness to start at the bottom may make the difference between success and failure in breaking into the field. After that, a combination of talent, motivation, imagination, hard work, and luck can lead to a rewarding career.

Public Relations Specialists

(D.O.T. 165.017-010, .067-010, and .167-010)

Nature of the Work

An organization's image, profitability, and even its continued existence can depend on how successfully it presents its goals and policies to the public. Public relations specialists help businesses, governments, universities, hospitals, public schools and other organizations build and maintain positive relationships with the public.

Public relations specialists apply their talents and skills in many different areas. They may handle press, community, or consumer relations, political campaigns, interest-group representation, fundraising, or employee recruitment. Public relations is not only "telling the employer's story," however. Understanding the attitudes and concerns of customers, employees, and various other "publics"—and communicating this information to management to help formulate policy—is also an important part of the job. In improving communications, public relations workers promote understanding and cooperation among the diverse groups that make up our society.

Public relations departments are found in a variety of organizations, and workers must tailor their programs to an employer's particular needs. A public relations director of a college or university, for example, may spend most of the time recruiting a student body, while one in a large corporation may work with stockholders, government agencies, and community groups.

Public relations workers put together information that keeps the public aware of their organization's policies, activities, and accomplishments, and keeps management aware of public attitudes. After preparing the information, they may contact people in the media who might be interested in printing, televising, or broadcasting their material. Many radio or television announcements, special reports, newspaper items, and magazine articles start at the desks of public relations workers. Sometimes the subject is a company and its policies towards its employees or its role in the community. Often the subject is a public issue, such as health, nutrition, energy, or the environment.

Public relations specialists also arrange and conduct programs in which company representatives will have direct contact with the public. Such work includes setting up speaking engagements and helping prepare speeches for company officials. These workers often represent employers at community projects or occasionally may show films at school assemblies, plan conventions, or manage fundraising campaigns.

Public relations staff members in very large firms may number 200 or more, but in most firms the number is much smaller. The director of public relations, who is often a vice president of the company, may develop overall plans and policies with a top management executive. In addition, large public relations departments employ writers, research workers, and other specialists who prepare material for the different groups the company wishes to reach.

Workers who handle publicity for an individual or direct public relations for a university, small business, or nonprofit organization may handle all aspects of the job. They contact people outside the organization, do the necessary planning and research, and prepare material for distribution. In many small firms these workers may combine public relations duties with advertising or sales promotion work; they may be top level officials or in more junior positions.

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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.

Working Conditions

Although public relations staffs generally work 35 to 40 hours a week, schedules may be rearranged because public relations programs operate against deadlines. Preparing and delivering speeches, attending meetings and community activities, and out-of-town travel may all be a part of the public relations specialist's routine. Thus, any of their regular assignments or special events may require workers to be at the job or on call around the clock.

Employment

Public relations workers held about 90,000 jobs in 1982. Manufacturing firms, public utilities, transportation companies, insurance companies, and trade and professional associations employ many of them. A sizable number work for government agencies (the Federal Government alone employs several thousand public information specialists), or for schools, colleges, museums, and other educational, religious, and human service organizations. The rapidly expanding health field also offers opportunities for public relations work, in hospitals, pharmaceutical companies, and medical associations, for example. Many workers are employed by public relations consulting firms which serve clients for a fee. Some work for advertising agencies.

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. Many public relations consulting firms, for example, are in New York, Los Angeles, Chicago, and Washington, D.C. A trend, however, is the dispersal of public relations jobs throughout the Nation, including smaller towns.

Public relations specialists need enthusiasm to motivate others.

Training, Other Qualifications, and Advancement

A college education combined with public relations experience is excellent preparation for public relations work. Although most beginners major in journalism, communications, or public relations, some employers prefer training in a field related to the firm's business—science, finance, or engineering, for example. Regardless of academic background, most entrants transfer from other occupations where they obtained valuable work experience. Many firms seek college graduates who have worked in electronic or print journalism. Others prefer workers with sales, engineering, or other experience that prepares them to deal knowledgeably with the organization's products or services.

In 1982, about 90 colleges and 25 graduate schools offered degree programs or special curriculums in public relations, usually administered by the journalism or communications department. In addition, about 300 colleges offered at least one course in this field. Typical courses include public relations theory and techniques, organizational communication, public relations management and administration, and other courses in public relations. Specialties are offered in public relations in business, government, and nonprofit organizations. Courses in advertising, journalism, business administration, political science, communications, psychology, sociology, and creative writing also help in preparing for a career in public relations. Persons who have a bachelor's degree in public relations or a related field generally enter staff positions, whereas those with a graduate degree in public relations are more qualified for administrative and managerial jobs.

Extracurricular activities such as writing for a school publication or television or radio station provide valuable experience. Many schools help students gain part-time or summer internships in public relations which provide training that can help in competing for entry positions. Membership in the Public Relations Student Society of America provides an opportunity for students to exchange views with public relations workers and to make professional contacts that may help later in securing a full-time job in the field. A portfolio of published articles, television or radio programs, slide presentations, and other work samples usually is an asset in finding a job.

Public relations workers spend much time gathering information. 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.

People who choose public relations as a career need an outgoing personality, self-confidence, and an understanding of human psychology. They should have the enthusiasm for motivating people. The ability to be competitive but function as part of a team are important qualifications.

Public information positions in the Federal Government generally require a college degree. Media, writing, or editing experience may help in gaining such a position. Requirements for similar positions in State and local governments vary.

Some companies—particularly those with large public relations staffs—have formal training programs for new employees. In other firms, new employees work 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 more difficult assignments, such as writing press releases, speeches, and articles for publication. In some firms, workers get all-round experience whereas in other firms they specialize.

Promotion to supervisory jobs may come as workers show they can handle more demanding and creative assignments. Some experienced public relations workers start their own consulting firms.

The Public Relations Society of America accredits public relations workers who have at least 5 years' experience in the field and have passed a comprehensive 6-hour examination (4 hours written, 2 hours oral). Employers consider professional recognition through such accreditation a sign of competence in this field.

Job Outlook

Employment of public relations workers is expected to increase about as fast as the average for all occupations through the mid-1990's. New jobs will result from growth in demand for these workers as corporations, associations, health facilities, and other large organizations expand their public relations staffs. The trend toward the use of public relations specialists by smaller organizations also should stimulate employment growth.

The vast majority of job openings, however, will result from the need to replace workers who leave the occupation. Turnover is relatively high, as an unusually large proportion of public relation specialists transfer to other occupations. Experience in public relations is good preparation for advertising and other closely related jobs, and there is a lot of movement into and out of this occupation.

Competition for beginning jobs is keen, for the glamour and excitement of public relations attract large numbers of jobseekers, including many with related experience. Prospects for a career in public relations are best for highly qualified applicants—talented people with sound academic preparation and some media experience.

Earnings

Median annual earnings for most public relation specialists who are not self-employed were $21,000 in 1982. The middle 50 percent earned between $15,000 and $28,000 annually; the

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lowest 10 percent earned less than $9,500, and the top 10 percent earned more than $38,000.

Starting salaries for college graduates beginning in public relations work generally ranged from $10,000 to $13,000 a year in 1982; persons with a graduate degree often started at a higher salary.

The salaries of experienced workers generally are highest in large organizations with extensive public relations programs. According to a 1982 survey, the median annual salary of top level public relations workers was $38,500. Median annual salaries ranged from about $29,300 in hospitals to $48,800 in public relations consulting firms.

In the Federal Government, persons with a bachelor's degree generally started at $16,600 a year in late 1982; those with a master's degree generally started at $20,300 a year. Additional education or experience could qualify applicants for a higher salary. Public information specialists in the Federal Government averaged about $31,000 a year in 1982.

Related Occupations

Public relations workers develop and distribute persuasive material in order to create favorable public attitudes. Other workers with similar jobs include fundraisers, account executives, lobbyists, promotion managers, advertising managers, and police officers involved in community relations.

Sources of Additional Information

Current information on the public relations field, salaries, and other items is available from:

PR Reporter, Dudley House, P.O. Box 600, Exeter, N.H. 03833.

Additional information on job opportunities and the public relations field in general may be purchased for $1 from:

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

Radio and Television Announcers and Newscasters

(D.O.T 131.067-010, .267-010, and -018; 159.147-010, and -014)

Nature of the Work

Announcers and newscasters are the most familiar of the many occupations in radio and television broadcasting. At small radio stations, most announcers are also disc jockeys. They introduce recorded music; present news, sports, weather, and commercials; interview guests; and report on community activities and other matters of interest to the audience. Often they "ad-lib" much of the commentary. In small stations, they may also operate the control board, sell commercial time to advertisers, and write commercial and news copy. Many radio stations also have news reporters who broadcast directly from the scene.

Announcers at television stations and large radio stations mostly specialize in a particular kind of programming such as sports events, general news broadcasts, or weather reports. They must be thoroughly familiar with these areas and, if a written script is required, may do the research and writing.

Television news broadcasting requires specialized "on-camera" personnel—anchor persons, television news reporters, and broadcast news analysts. In large news operations, such as those of stations in major cities or national networks, all three often take part in the news broadcast.

The news anchor, or a pair of co-anchors, presents the day's important news stories. Throughout the broadcast, the anchors, sometimes called newscasters, introduce films and interviews prepared by news reporters that provide in-depth information on the event being covered.

Radio and television broadcast news analysts, called commentators, also present current news stories, but normally interpret them or discuss how specific events may affect the Nation or us personally.

Frequently, a smaller television station employs only a news anchor who reads accounts of the day's stories and introduces background reports provided by the networks or by a television news service.

Announcers frequently participate in community activities. A sports announcer, for example, might be the master of ceremonies at a touchdown club banquet or greet customers at the opening of a new sporting goods store. Some announcers become well-known and highly paid personalities.

Working Conditions

Announcers and newscasters usually work in well-lighted, air-conditioned, soundproof studios. However, when broadcasting from a war zone or the site of a civil disturbance, fire, flood, or other emergency situation, newscasters may risk injury.

Working within a tight schedule requires split-second timing and can be physically and mentally demanding. Those who enjoy the work, however, feel that the intangible rewards—creative work, many personal contacts, and the satisfaction of becoming widely known—far outweigh the disadvantages of irregular and often unpredictable hours, work pressures, and disrupted personal lives.

Employment

Radio and television announcers and newscasters held about 55,000 jobs in 1982. Nearly all are staff announcers, but some are freelance announcers who sell their services for individual assignments to networks and stations, or to advertising agencies and other independent producers.

Training, Other Qualifications, and Advancement

Entry to this profession is highly competitive. While formal training in a college or technical school is valuable, station officials pay particular attention to taped auditions that present samples of an applicant's delivery and—in television—appearance and style on commercials, news, interviews, and other copy. College graduates and others hired by television stations usually start out as production secretaries, production assistants, researchers, or reporters and are given a chance to move into announcing if they show an aptitude for broadcasting.

Announcers must have a pleasant and well-controlled voice, good timing, and excellent pronunciation. Correct English usage and a knowledge of dramatics, sports, music, and current events improve chances for success. Good judgment and the ability to react quickly

Television news team discusses late-breaking story before going on the air.

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in emergencies are important because announcers may be required to "ad-lib" all or part of a show. A neat, pleasing appearance is essential, of course, for television announcers and news broadcasters. The most successful announcers attract a large viewing or listening audience by combining a pleasing personality with an appealing style.

High school courses in English, public speaking, drama, foreign languages, and electronics, plus sports and music hobbies, are valuable background for prospective announcers. A liberal arts education provides an excellent background for an announcer, and many universities offer courses of study in the broadcasting field. Students at these institutions also may gain valuable experience by supplementing their courses with part-time work at the campus radio station and summer work at local stations, filling in for vacationing staff members. A number of private broadcasting schools offer training in announcing.

Persons considering enrolling in any school, whether public or private, that offers training for a broadcasting career should contact the personnel managers of radio and television stations and broadcasting trade organizations to determine the school's performance in producing suitably trained candidates.

Announcers generally get their first broadcasting jobs in a small station. Because announcers in small radio stations sometimes operate transmitters, prospective announcers often obtain a Federal Communications Commission (FCC) restricted radiotelephone operator permit. This qualifies them to become involved in the routine operation of radio transmitters and makes them much more useful to these stations. (For additional information on FCC requirements, 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 community, an ambitious and talented announcer may move to a better paying job in a large city. An announcer also may advance by hosting a regular program as a disc jockey, sportscaster, or other specialist. In the national networks, competition for jobs is particularly intense, and announcers often must be college graduates and have several years of successful announcing experience before they are given an audition.

Job Outlook

Competition for beginning jobs as announcers will be very keen through the mid-1990's. The broadcasting field typically attracts many more jobseekers than there are jobs. It will be easier to get a job in radio than in television because more radio stations hire beginners. Many of these jobs will be in small stations, however, where the pay is relatively low. Because competition for ratings is so intense in major metropolitan areas, large radio and television stations will continue to seek highly experienced announcers and newscasters who have proven that they can attract a large audience.

Employment of announcers is expected to increase about as fast as the average for all occupations through the mid-1990's as new radio and television stations are licensed and more cable television systems originate their own programming. Employment of radio announcers may not keep pace with the increase in the number of stations, however, because of the increased use of automatic programming equipment. Although announcers are rather strongly attached to their occupation, most openings in this relatively small occupation will arise from the need to replace those who transfer to other fields of work, retire, or die.

Over the years, employment in this occupation has not been significantly affected by downturns in the economy. When poor business conditions and decreasing advertising revenues necessitate employment reductions, radio and television stations tend to cut back the number of production and "behind-the-scenes" workers rather than reduce the number of announcers and broadcasters.

Earnings

Salaries in broadcasting vary widely with the type of station, the size of the market it serves, and with what the announcer has to offer.

Median weekly earnings of full-time announcers were about $300 in 1982; the middle 50 percent earned between $240 and $550 weekly. The lowest 10 percent earned less than $200 and the top 10 percent, more than $700.

According to a survey conducted by the National Association of Broadcasters, 1981 salaries of radio announcers ranged from a low of $190 to a high of $420. Salaries of TV announcers ranged from $350 to more than $1000 a week.

Most announcers in large stations work a 40-hour week and receive overtime pay for additional hours. Many announcers in small stations work a considerable amount of overtime. 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.

Related Occupations

The success of radio and television announcers and news broadcasters is largely dependent upon their ability to speak effectively to their audiences. Others for whom oral communications skills are vital are interpreters, narrators, sales workers, public relations workers, and dramatic and comedy performers.

Sources of Additional Information

For a list of schools that offer programs and courses in broadcasting, contact:

Broadcast Education Association, 1771 N St. NW., Washington, D.C. 20036.

For information on FCC licensure, write to:

Federal Communications Commission, 1919 M St. NW., Washington, D.C. 20552.

General information on the broadcasting industry is available from:

National Association of Broadcasters, 1771 N St. NW., Washington, D.C. 20036.

Reporters and Correspondents

(D.O.T. 131.267-018)

Nature of the Work

Reporters and correspondents play an important role in society. They gather information and prepare stories that inform us about local, state, national, and international events; present differing points of view on current issues; and monitor the actions of public officials and others who exercise power. In covering a story, they may do background research, review public records, and interview a variety of people. As a rule, reporters take notes or use a tape recorder while collecting facts and write their stories upon returning to the office. In order to meet deadlines, however, they sometimes telephone their information or stories to rewriters who write or transcribe the stories for them.

Reporters in radio and television broadcasting often report "live" from the scene of a newsworthy event, where they have to compose their story on the spot. They then may do voice-overs for a film report in the studio and appear on camera to introduce the story or comment on it.

Large newspaper and radio and television stations frequently assign reporters to investigate specific locations or "beats," such as police stations or the courts, to gather news originating in these places. General assignment reporters write up local news, such as a story about a school board meeting or an obituary of a community leader. Many newspaper, magazine, and wire service reporters with a background or interest in a particular subject analyze and interpret the news in specialized fields such as medicine, politics, foreign affairs, sports, fashion, art, theater, consumer affairs, travel, finance, social events, science, education, business, labor, and religion. Critics review restaurants and movies as well as literary, artistic, and musical works and live performances, while editorial writers present viewpoints on topics of public interest.

Newspapers, magazines, wire services, and radio and television networks frequently station reporters known as correspondents in large cities as well as in other countries to prepare stories on major news events occurring in these locations. Reporters on small newspapers cover all aspects of local news, and also may take photographs, write headlines, lay out pages, edit wire service copy, and write editorials. On some small weeklies, they also may solicit advertisements, sell subscriptions, and perform general office work.

Working Conditions

The work of reporters and correspondents is usually hectic. They are under pressure to meet deadlines and many work under trying conditions. In the office, for example, they often must contend with loud conversation and the confusion of people constantly on the go. When reporting from the scene, radio and television

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reporters may be distracted by curious onlookers, police, or other emergency workers. Some assignments covering wars, political uprisings, fires, floods, and other events may be dangerous.

Working hours vary by type of employer. Reporters working for morning papers usually work from late afternoon until midnight. Those on afternoon or evening papers generally work from early morning until early or midafternoon. Radio and television reporters generally are assigned to a day or evening shift so that the news can be covered whenever it happens. Although magazine reporters often can schedule their work during the day, all reporters may have to change their work hours to meet a deadline or to update an earlier report because of late-breaking developments. Their work may demand long hours, irregular schedules, and some travel. Foreign correspondents often work late at night to send news to papers in time for printing.

Employment

Reporters and correspondents held about 51,000 jobs in 1982. Four of every five worked for newspapers, either large city daily papers or daily or weekly papers in suburban communities and small towns. Others worked in radio and television broadcasting and for magazines and wire services.

Training, Other Qualifications, and Advancement

Most editors prefer graduates who have a degree in journalism, which includes training in the liberal arts along with professional training in journalism. A few prefer applicants who have a bachelor's degree in liberal arts and a master's degree in journalism. High school courses in English, journalism, social studies, and typing provide a good foundation.

In 1982, the vast majority of journalism graduates who landed jobs on newspapers, magazines, or with news wire services prepared specifically for news work by majoring in news-editorial journalism.

Bachelor's degree programs in journalism are available in about 300 colleges. About three-fourths of the courses in a typical undergraduate journalism curriculum are in liberal arts. Required journalism courses include introductory mass media, basic reporting and copy editing, history of journalism, and press law and ethics. In addition, students planning a career in broadcasting take courses in radio and television newscasting and production. Other journalism courses are selected in the student's specific area of interest.

About 350 community and junior colleges offer journalism courses or programs. Credit earned may be transferable to 4-year college programs in journalism. Some junior colleges also offer programs especially designed to prepare the student directly for employment as a general assignment reporter. However, such graduates find it increasingly difficult to compete with graduates of 4-year programs. The Armed Forces also provide some training in journalism.

Reporters usually work under the pressure of deadlines.

A master's degree in journalism was offered by about 70 schools in 1982; about 20 schools offered the Ph.D. degree. Some graduate programs are intended primarily as preparation for news careers, while others concentrate on preparing journalism teachers, researchers and theorists, and advertising and public relations workers.

Liberal arts courses useful to persons preparing for a reporting career include English courses with an emphasis on writing, sociology, political science, economics, history, psychology, computer science, business, and speech. The ability to read and speak a foreign language also is desirable. Those who aspire to reporting in a specialized field—science or finance, for example—should concentrate on coursework in those subject areas.

Typing skill is essential because reporters type their own news stories. Also, a growing number of reporters use computerized word processing equipment to write and edit stories. The ability to take shorthand also is useful. Often, a knowledge of news photography is valuable.

The Dow Jones Newspaper Fund and individual newspapers and magazines offer summer internships that provide college students with an opportunity to perform a variety of basic reporting or editing duties. Experience acquired through such internships helps immeasurably in job placement after graduation. In addition, more than 3,100 journalism scholarships, fellowships, and assistantships were awarded to college journalism students by universities, newspapers, foundations, and professional organizations in 1981.

News reporting involves a great deal of responsibility, because 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. The ability to present facts and opinions clearly and succinctly is essential for success in this field. Accuracy and objectivity are equally important, because, among other reasons, untrue or libelous statements can lead to costly lawsuits.

Important personal characteristics include a "nose for news," curiosity, persistence, initiative, poise, resourcefulness, an accurate memory, and the physical stamina and emotional stability to deal with pressing deadlines, irregular hours, and sometimes dangerous assignments. Being at ease on camera or in front of a microphone is essential for broadcast reporters. Because some assignments lead reporters to unfamiliar places, they must be able to adapt to strange surroundings and feel at ease with a variety of people.

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 and is paid on the basis of the stories printed. High school and college newspapers and church or community newsletters also provide writing and editing experience that may be helpful in getting a job.

Most beginners start with small publications as general assignment reporters or copy editors. A few outstanding journalism graduates are hired by large city papers and national magazines, but this is the exception rather than the rule. Large employers generally require several years of reporting experience.

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Beginning reporters 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.

Reporters may advance to reporting for larger papers or press services. However, competition for such positions is keen, and news executives receive many applications from highly qualified reporters every year. 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 extremely keen. Other reporters transfer to related fields such as public relations or preparing copy for radio and television news programs.

Job Outlook

Employment of reporters and correspondents is expected to grow about as fast as the average for all occupations through the mid-1990's. This growth will come about primarily because of an anticipated increase in the number of smalltown and suburban daily and weekly newspapers. For the most part, little or no increase is expected in the number of big city dailies, although some of them may increase the size of their reporting staffs. Magazines and radio and television broadcasting should continue to provide a significant number of jobs, but major news magazines and large radio and television stations primarily seek only experienced reporters. The need to replace experienced reporters and correspondents who leave the occupation each year will account for the vast majority of all job openings. Compared to other professional workers, a somewhat larger proportion of reporters and correspondents transfer to other occupations—reflecting the somewhat stressful and hectic nature of the job. Some people decide they don't like the lifestyle and transfer to other occupations where their skills are valuable, especially public relations and advertising work.

Overall, graduates who have majored in news-editorial journalism and completed an internship while in school should have the best prospects for reporting jobs. Most editors prefer to hire the top graduates of accredited programs. Talented writers who can handle highly specialized scientific or technical subjects will be at an advantage in the job market. Small newspapers often look for beginning reporters who are acquainted with the community and who can help with photography and other aspects of newspaper production. Persons without at least a bachelor's degree in journalism will face increasingly stiff competition for entry level positions.

Newspapers and magazines located in small towns and suburban areas are expected to continue to offer the most opportunities for beginning reporters. Journalism graduates who are willing to relocate and start at relatively low salaries are likely to find reporting jobs on these newspapers. Openings arise on small publications as reporters gain experience and move up to editorial positions, or transfer to reporting jobs on larger newspapers and magazines.

Competition for reporting jobs on large metropolitan newspapers and national magazines will be keen. Most of these employers require experience and do not ordinarily hire new graduates. Sometimes, however, new graduates find jobs on major publications because they have credentials in an area for which the paper has a pressing need. Occasionally, the experience and contacts gained through an internship program or summer job lead to a reporting job directly after graduation.

Because enrollments in journalism education programs are expected to continue rising through the mid-1990's, college teaching opportunities are expected to be good for qualified applicants—generally, Ph.D.'s with practical reporting experience. Some highly qualified reporters with a master's degree will find teaching positions in journalism departments of colleges and junior colleges. This favorable outlook for journalism educators contrasts with the generally bleak prospect for college faculty in many other academic disciplines.

Employment of reporters and correspondents generally is not cut back sharply during slack economic periods, but when business conditions force publishers and broadcasters to reduce spending, new hiring may be temporarily slowed or even halted.

College graduates who have majored in journalism also have the background for work in such closely related fields as advertising and public relations. Every year, a substantial number of journalism graduates take media jobs in these fields. Other graduates accept sales, managerial, and other nonmedia positions, while still others continue their training and then find jobs in fields such as law, business, public administration, and political science.

Earnings

Median weekly earnings of full-time reporters were about $380 in 1982; the middle 50 percent earned between $270 and $550 weekly. Ten percent earned less than $215, and 10 percent earned more than $700.

Reporters working for daily newspapers and magazines having contracts negotiated by the Newspaper Guild had starting salaries ranging from about $175 to $737 a week in 1982. The majority earned between $300 and $450 a week.

Reporters having 4 or 5 years of experience averaged $493 a week in early 1982. Virtually all experienced reporters earned over $300 a week, while the top contractual salary was $767 a week. A number of top reporters on big city dailies earned even more, on the basis of merit. In general, earnings of reporters are above the average earnings of nonsupervisory workers in private industry, except farming.

Most newspaper reporters generally work a 5-day, 35- or 40-hour week and receive extra pay for overtime work. Benefits may vary widely according to length of service and the size and location of the newspapers. Most reporters, however, receive benefits such as paid vacations, group insurance, and pension plans.

Related Occupations

Reporters and correspondents must write clearly and effectively to succeed in their profession. Others for whom writing ability is essential include technical writers, advertising copy writers, public relations workers, educational writers, fiction writers, biographers, screen writers, and editors.

Sources of Additional Information

Career information, including pamphlets entitled *Your Future in Newspapers* and *Facts about Newspapers* is available from:

American Newspaper Publishers Association Foundation, The Newspaper Center, Box 17407, Dulles International Airport, Washington, D.C. 20041.

Information on careers in journalism, colleges and universities that offer degree programs in journalism or communications, and journalism scholarships and internships may be obtained without charge from:

The Dow Jones Newspaper Fund, Inc., P.O. Box 300, Princeton, N.J. 08540.

For a list of junior and community colleges offering programs in journalism, contact:

National Community College Journalism Association, San Antonio College, 1300 San Pedro Ave., San Antonio, Tex. 78284.

Information on union wage rates for newspaper and magazine reporters is available from:

The Newspaper Guild, Research and Information Department, 1125 15th St. NW., Washington, D.C. 20005.

For a list of schools with accredited programs in their journalism departments, send a stamped, self-addressed envelope to:

Accrediting Council on Education for Journalism and Mass Communication, School of Journalism, University of Missouri, P.O. 838, Columbia, Mo. 65205.

For general information about careers in journalism, contact:

Association For Education in Journalism and Mass Communication, University of South Carolina College of Journalism, Columbia, S.C. 29208.

Careers in Communications, a booklet providing information on opportunities for women in newspaper reporting and other communications fields is available from:

Women In Communications, Inc., P.O. Box 9561, Austin, Tex. 78766.

A pamphlet titled *A Career in Newspapers*, can be obtained from:

National Newspaper Association, 1627 K St. NW., Suite 400 Washington, D.C. 20006.

Names and locations of newspapers and a list of schools and departments of journalism are published in the *Editor and Publisher International Year Book*, available in most public libraries and newspaper offices.

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Writers and Editors

(D.O.T. 131 except .267-010; -018; -022; 132 except .017; .037-014; -018; -022; and 139.087-010)

Nature of the Work

Writers and editors communicate through the written word. Writers develop original fiction and nonfiction prose for books, magazines, trade journals, newspapers, technical studies and reports, company newsletters, radio and television broadcasts, and advertisements. Editors supervise writers and select and prepare material for publication or broadcasting.

Writers start by selecting a topic or being assigned one by an editor. They then gather information on the topic through personal observation, library research, and interviews. Sometimes the information gathered may cause writers to change the focus to a related topic that is more interesting. From the information gathered, they select and organize the material to be used, and finally put it into words that will convey it to the reader with the desired effect. Writers often revise or rewrite sections, searching for the best organization of the material or just the right phrasing. Newswriters—writers employed by newspapers and radio and television news departments—write news items for inclusion in newspapers or news broadcasts. Starting with information supplied by reporters or wire services, they write news stories or scripts for newscasters. Reporters and correspondents are described elsewhere in this section of the *Handbook*.

Technical writers put scientific and technical information into readily understandable language. They prepare manuals, catalogs, parts lists, and instructional materials used by sales representatives to sell machinery or scientific equipment and by technicians to install, maintain, and service it.

Copy writers write advertising copy for use by publication or broadcast media to promote the sale of goods and services.

Established writers may work on a freelance basis where they sell their work to publishers, manufacturing firms, and advertising agencies. They sometimes are hired to complete specific assignments such as writing about a new product or technique.

Editors frequently do some writing and almost always do much rewriting and editing, but their primary duties are to plan the contents of the publication and to supervise its preparation. They decide what will appeal to readers, assign topics to writers, and oversee the production of the book, magazine, or newspaper. In small organizations, one editor has full responsibility for the publication. In larger ones, an executive editor oversees the activities of associate or assistant editors who have responsibility for particular subjects, such as fiction, international news, or sports. Administrative duties of editors include hiring and firing writers and other employees, planning budgets, negotiating contracts with freelance writers, and general managerial duties. In broadcasting companies, program directors have responsibilities comparable to those of editors.

Editors and program directors are often helped by assistants who may have the title of assistant editor, editorial assistant, copy editor, or production assistant. Many of these assistants hold entry level jobs. They review copy for errors in grammar, punctuation, and spelling. They check manuscripts for readability, style, and agreement with editorial policy. They add and rearrange sentences to improve clarity or delete incorrect and unnecessary material. Editorial assistants also perform research for writers and verify facts, dates, and statistics. They may help prepare material for publication or broadcast by arranging page layouts of articles, photographs, and advertising or by planning the use of films. They may also compose headlines, prepare copy for typesetters, and proofread the printer's galleys. Some editorial assistants read and evaluate manuscripts submitted by freelance writers or answer letters about published or broadcast material. Production assistants clip stories that come over the wire services' printers, answer phones, and make copies of material for newswriters, editors, and program directors.

Working Conditions

Working conditions for writers and editors vary with the kind of publication they work on and the kind of articles they produce. Some work in comfortable, private offices; others work in noisy rooms filled with the sound of typewriters and other word processing equipment and other writers tracking down information over the telephone. The search for information sometimes requires travel and visits to diverse workplaces, such as factories, offices, laboratories, the ballpark, or the theater, but many have to be content with telephone interviews and the library.

The workweek usually runs 35 to 40 hours. Night and weekend work is required of those who prepare morning or weekend publications and broadcasts. Some workers must also put in overtime to meet deadlines or to cover a late-developing story. The more frequently the publication is issued, the more frequent the deadlines and the greater the pressure to meet them. The need to understand complex technical data may also be a source of stress or pressure.

Employment

Writers and editors held about 120,000 jobs in 1982. Nearly 40 percent worked for newspapers, magazines, and book publishers. Substantial numbers also worked on journals and newsletters published by business and nonprofit organizations, such as professional associations, labor unions, and religious organizations. Others wrote and edited advertising and public relations materials for advertising agencies, public relations firms, and large corporations. Some also worked in radio and television broadcasting; others developed publications for Federal, State, and local governments.

Many technical writers work for firms manufacturing aircraft, chemicals, pharmaceuticals, and computer and other electronic equipment. Firms in the energy, communications, and computer software fields also employ many technical writers.

Persons who write and edit for major book publishers, magazines, broadcasting companies, advertising agencies and public relations firms, and the Federal Government tend to be concentrated in New York, Chicago, Los Angeles, Boston, Philadelphia, San Francisco, and Washington, D.C. More widely dispersed throughout the country, on the other hand, are those who work for newspapers; corporations; and professional, religious, business, technical, and trade union magazines or journals. Technical writers are employed throughout the country but the largest concentrations are in the Northeast, Texas, and California.

Thousands of other persons work as freelancers—earning some income from their articles, books, and, less commonly, television and movie scripts. Most support themselves primarily with income from other sources.

Training, Other Qualifications, and Advancement

Formal educational requirements for writing and editing jobs vary. A college degree is required by many employers, but there is little agreement as to the preferred major. Some employers look for a broad liberal arts background or a major in literature, history, philosophy, or

Writers start by selecting a topic or being assigned one by an editor.

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one of the social sciences. Others prefer to hire people with degrees in communications or journalism.

Some jobs, such as technical writing, require a degree in or some knowledge about a specialized field—engineering, business, or one of the sciences. Relatively few technical writers enter the occupation directly from college. The majority work initially in other jobs, usually as technicians, scientists, or engineers. Some begin as research assistants, editorial assistants, or trainees in a company's technical information or advertising department. In time, these people may assume writing duties and develop technical communication skills.

Whatever their educational background, writers and editors must be able to express ideas clearly and logically. Creativity, intellectual curiosity, a broad range of knowledge, self-motivation, and perseverance are also valuable assets. For some jobs, the ability to concentrate amid confusion and to produce under pressure is essential. Since writing requires research, writers must be familiar with research techniques. Editors must have good judgment in deciding what material to accept and what to reject. They must also have tact and the ability to guide and encourage others in their work.

All prospective writers need practical writing experience. High school and college newspapers, literary magazines, and small community newspapers and radio stations all provide valuable—but sometimes unpaid—experience. Many magazines, newspapers, and radio and TV stations have summer internships in which students can learn about the publishing and broadcasting business. Interns might run errands, answer phones, conduct some research and interviews, or even write short pieces, depending on the employer.

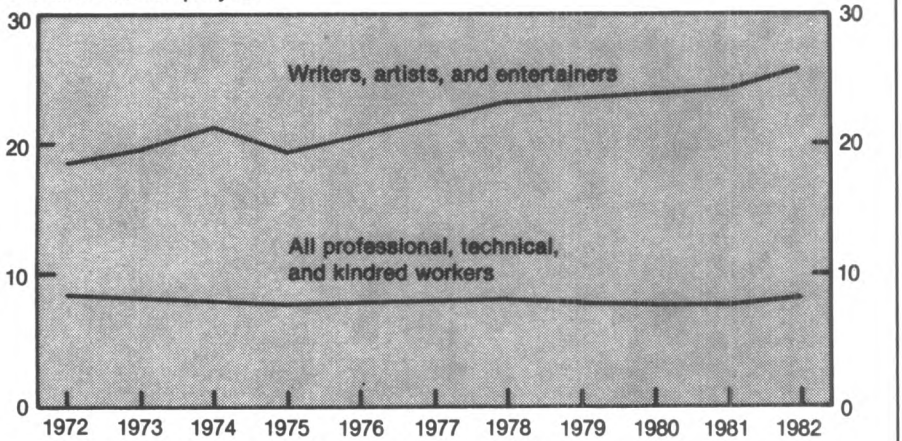
Advancement for writers and editors depends, in part, on the size of the organization for which they work. In small firms, beginning writers and editors may do a little bit of everything, not only working as editorial or production assistants but also writing or editing material right away. They often advance by moving to other firms, so turnover among beginning writers and editors is high. In larger firms, jobs are usually structured more formally. Persons in entry-level positions generally do research, fact-checking, or copy-editing. They take on full-scale writing or editing duties less rapidly than do the employees of small companies. Advancement comes as they are assigned more important articles to write or edit.

Job Outlook

Employment of writers and editors is expected to increase faster than the average for all occupations through the mid-1990's. Employment of salaried writers and editors by newspapers, periodicals, book publishers, and nonprofit organizations—including research agencies and religious, business, professional, and civic associations—is expected to increase with growing demand for their publications. Growth of advertising and public relations agencies should also be a source of new jobs. Demand for technical writers is expected to increase because of the continuing expansion of scientific and technical information and the continued need to communicate it to researchers, corporate managers, sales representatives, and technicians. With the increasing complexity of industrial and scientific equipment, more users will depend on the technical writer's ability to prepare precise but simple explanations and instructions. Besides jobs created by increased demand for writers and editors, many job openings will occur as experienced workers in this field transfer to other occupations, retire, or die.

Each year, thousands of young people with college degrees in English, journalism, communications, and the liberal arts seek writing and editing jobs. Many end up in other occupations because the number of people qualified to work as writers and editors greatly exceeds the number of positions available, despite the high turnover in these occupations. Throughout the mid-1990's, the outlook for writing and editing jobs is expected to continue to be keenly competitive. Opportunities will be best in firms that prepare business and trade publications and in technical writing. Persons considering careers in writing and editing should keep their options open because the job market in this field is very competitive. Academic preparation in a field unrelated to writing may prove useful to some people, either to qualify them as writers specializing in that field, or to qualify them for a job in the field itself in the event that they are unable to get a salaried writing job.

A much larger proportion of writers, artists, and entertainers are self-employed than of other professional, technical, and kindred workers.



SOURCE: Bureau of Labor Statistics

Earnings

In 1982, beginning salaries for writers and editorial assistants ranged from $14,000 to $19,000 annually, according to surveys by the American Management Associations. Salaries for experienced writers and researchers generally ranged between $18,000 and $29,000 a year, depending on their qualifications and the size of the publication on which they worked. Experienced editors generally earned between $20,000 and $36,000 a year; supervisory editors, $26,000 to $40,000 a year.

Senior editors on large circulation newspapers and magazines earned over $60,000 per year. Many writers and editors supplemented their salaried income by doing freelance work.

Writers and editors employed by the Federal Government earned an average of $26,000 a year in 1982.

Related Occupations

Writers and editors communicate ideas and information to individuals for their education and entertainment. Other communications occupations include newspaper reporters and correspondents, radio and television announcers, advertising and public relations workers, and teachers of journalism.

Sources of Additional Information

For information on writing and editing careers in the field of communications, contact:

Women in Communications, Inc., P.O. Box 9561, Austin, Tex. 78766.

For a guide to journalism careers and scholarships, contact:

The Dow Jones Newspaper Fund, P.O. Box 300, Princeton, N.J. 08540.

For information on college internships in magazine editing, contact:

American Society of Magazine Editors, 575 Lexington Ave., New York, N.Y. 10022.

For information on careers in technical writing, contact:

Society for Technical Communication, Inc., 815 15th St. NW., Suite 506, Washington, D.C. 20005. *Academic Programs in Technical Communication*, a listing of colleges and universities that offer programs in technical writing, is also available from the Society for $8.

For information on careers in business communication, contact:

American Business Communication Association, 100 English Building, 608 South Wright St., Urbana, Ill. 61801.

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Design Occupations

People in design occupations are applied artists. They design clothing, automobiles, appliances, and other products, plan and design interiors of buildings, arrange flowers, illustrate publications, and compose and take photographs. They create or design objects that are both practical and attractive and make sure that the places in which people live and work are pleasant yet functional. Manufacturers, retail and wholesale trade establishments, advertising agencies, printing and publishing firms, theatrical producers and television and motion picture studios employ designers. In addition, many are self-employed, working in their own studios.

Applied artists design a variety of products, settings, and advertisements as well as oversee the work of other artists or craft workers who produce or install them. *Commercial artists* design newspaper and TV advertisements as well as catalogs, books, and instructional materials; *photographers* take pictures to convey an idea or tell a story; *industrial designers* develop functional, attractive articles and packages for everyday use; *set designers* design movie, television, and theater sets. *interior designers* arrange furnishings and spaces in homes, stores, and offices; *fashion designers* design clothes, fabrics and accessories. *memorial designers* design monuments, statues, and memorials; and *floral designers* create floral arrangements to express the thought and sentiments of the sender.

Artistic talent is crucial in all design occupations. People in this field need strong color sense, an eye for detail, a sense of balance and proportion, and sensitivity to beauty. They must be creative, imaginative, persistent, and able to communicate visually and verbally. A good portfolio—a collection of examples of a designer's best work—is sometimes more important in finding a job than formal education.

Design careers require varying levels of training. While floral designers often learn their skills on the job and may not even need a high school diploma, industrial designers as a rule must complete 4 or more years of college. Persons with appropriate experience and a major in engineering, architecture, and fine arts may also gain entry to this field. A liberal arts education and training in painting, sculpture, and architecture are important for commercial artists. Fashion designers get their training in 2- or 3-year programs in schools of fashion design or in 4-year colleges leading to a bachelor's degree in fashion design. Although not a requirement, formal training is becoming increasingly important for interior designers. This is available in 3-year professional school programs of interior design as well as in 4-year college and university programs. The curriculum for these occupations includes principles of design, art and art history, mechanical and architectural drawing, painting, architecture, and basic engineering. Although a college degree is not necessary for photographers, 2-year and 4-year institutions offer courses or degree programs in photography.

Creative work can be frustrating, even discouraging, during periods when new ideas don't come—or when the designer's ideas clash with those of a client. Tact, problem-solving skills, the ability to work independently as well as with others, and sound professional judgment are important traits for individuals in this field.

The statements that follow discuss design occupations in more detail. Several other jobs that require design skills are described elsewhere in the *Handbook*. See the statements on urban and regional planners, engineers, and architects.

Commercial and Graphic Artists and Designers

(D.O.T. 141.031-010, .061, .067-010, .081; 142.031-010, 149.031-010; 962.381-018)

Nature of the Work

Some professional artists are painters, who produce works of art for display in museums, art galleries, and homes. Most, however, are commercial and graphic artists and designers, who illustrate and design the flood of magazine, newspaper, and TV advertisements as well as catalogs, brochures, instruction manuals, technical literature, book and record jackets, textiles, and many other items requiring visual appeal.

The field of commercial art, also called graphic art or design, is very broad and includes some activities only loosely related to what is usually thought of as art. Most people in the field work in either illustration or design.

Illustrators paint or draw pictures. Many do a variety of illustrations while others are specialists.

Fashion artists (D.O.T. 141.061-014) specialize in stylish and fashionable illustrations of the latest in women's and men's clothing. This specialty is perhaps the most glamorous and "artistic" commercial art specialty.

Medical and scientific illustrators (D.O.T. 141.061-026) combine an interest in art with knowledge of the biological sciences. They draw illustrations of parts of the human body, or animals and plants. Their work is used in medical textbooks and other publications, for research purposes, and in lectures and presentations.

Cartoonists (D.O.T. 141.061-010) form another illustration specialty. They draw political cartoons, newspaper comic strips, and comic books. Some cartoonists work with others who create the idea or story and write the captions. Most cartoonists, however, must have humorous, critical, or dramatic talents in addition to drawing talent.

Animators (D.O.T. 141.081-010) draw the large series of pictures which, when transferred to film, form the animated cartoons seen in the movies and on TV. Animators are employed almost exclusively in the motion picture industry, which produces animated cartoons for TV and the movies.

Some illustrators draw "story boards" for TV commercials. Story boards present TV commercials in a series of scenes in much the same way as a newspaper comic strip tells a story, so that the advertising agency and the client (the company doing the advertising) can evaluate the effectiveness of proposed commercials. Story boards may also serve as guides to placement of actors and cameras and to other details during the production of commercials. Some illustrators draw for children's books; others specialize in book and record jacket illustration.

Designers. Many in art-related jobs do little or no drawing, but instead create or supervise the creation of effective visual impressions of advertisements and industrial products.

Art directors (D.O.T. 141.031-010) decide the art, design, photography, and type style that go into published materials and TV advertisements. In many organizations, an executive or managing art director is in charge of a number of art directors who are assigned to many individual projects or advertising accounts.

Art directors create a visual effect that will sell a product. They may design and illustrate advertisements or other artwork themselves, or direct and supervise others in this work. Art directors are usually well paid and have commensurate responsibility. Their job is considered the top commercial art-related job, although some regard art directors as managers or administrators rather than artists.

The lowest level art positions in an advertising agency or art studio are *layout* or *paste-up artists*. These jobs are often entry level positions which provide experience for aspiring commercial artists. Layout artists carefully position elements of the advertisement (photographs, illustrations, and text) according to the art director's instructions. The magazine or newspaper uses this "mechanical," as it is called, as a guide to print the advertisement.

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Commercial artists face keen competition for both salaried jobs and freelance work.

Working Conditions

Most commercial artists are salaried employees. They work in offices and studios and usually have hours and working conditions similar to those of other office workers.

A large proportion of commercial artists, especially illustrators, are freelancers who do individual projects for those wishing to use their services. Until an illustrator develops a reputation and a regular clientele, he or she will not receive a steady income. Much effort often must be expended on selling potential customers on the quality of one's work and in acquiring experience and a reputation. Freelancers can set their own hours and working conditions. However, both freelance and salaried commercial artists must frequently meet tight deadlines which necessitate long hours of work until the project is complete.

Employment

Commercial and graphic artists held about 133,000 jobs in 1982. Many were employed by the advertising industry, either directly or indirectly as freelancers, or by graphic art studios which do much of their work for advertising agencies.

The publishing industry also employs many commercial artists. Other industries such as department stores and other retailers, durable goods manufacturing firms, motion picture producers, and government agencies employ commercial artists inin-house advertising, graphic arts, and related activities.

Commercial and graphic artists are concentrated in larger cities. New York City has by far the largest concentration because it is the center of the advertising and publishing industries. Chicago and Los Angeles also have many artists. However, there are commercial and graphic artists employed almost everywhere except in very small towns and rural areas.

Training, Other Qualifications, and Advancement

In the graphic arts field, demonstrated ability rather than evidence of appropriate training or other qualifications is all that is needed for success. The device used by almost all in the graphic arts field to gain employment or freelance work is the "portfolio," a collection of examples of the artist's best work. Evidence of appropriate talent and flair shown in the portfolio is the most important factor used by art directors and others in deciding whether to hire or contract out work to an artist. In theory, a person with a good portfolio but no training or experience could succeed in graphic arts. In reality, to put together a successful portfolio, most aspiring graphic artists must acquire skills in a postsecondary art school—usually in a 4-year program. A bachelor's degree in fine arts is less useful because many of the technical skills necessary are not taught and the emphasis is on art for its own sake rather than on art for marketing and other purposes. There also are many other kinds of art schools, some with 2-year associate degree programs, as well as vocational education programs. Some of these provide the technical skills necessary to get a beginning job but may not give the background necessary for advancement. However, there are always exceptions to any rule in this field. What really counts is talent, and some with little or no formal training have been very successful in commercial art.

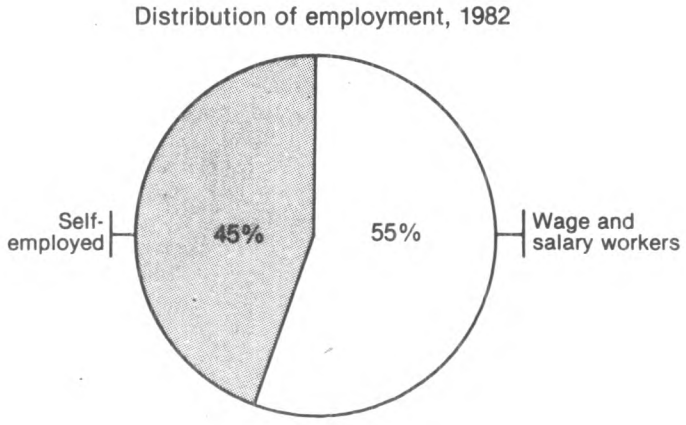
Persons hired in advertising agencies or graphic arts studios often start with relatively routine work such as paste-ups or mechanicals. While doing this work, however, they may observe and practice their skills on the side. Those with talent may advance to assistant art director and then to art director. Others may gain enough skill to succeed as a freelancer or may prefer to specialize in an area such as calligraphy. Many freelancers get started by working part time as a freelancer while continuing to hold a full-time job. Others have enough talent and confidence in their ability to start out as a freelancer immediately after they graduate from art school. Many actually freelance part time while still in school, an excellent way to develop experience and a portfolio of published work.

The freelancer develops a set of clients who regularly contract for work at good rates. Some successful freelancers are widely recognized for their skill in specialties such as children's book illustration or high fashion illustration. These freelancers earn high incomes and can pick and choose the type of work they will do.

Job Outlook

The commercial art and graphics field has a glamorous and exciting image. Because formal entry qualifications are few, many people at

Almost half of all commercial artists are self-employed.



SOURCE: Bureau of Labor Statistics

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least partially qualify for entry. Consequently, competition is keen for salaried jobs and freelance work. Many commercial artists find only enough freelance work to occupy them part time. Many freelancers have to charge very low prices until they acquire experience and a good reputation. Despite an oversupply of those seeking commercial art jobs, those with outstanding talent are eagerly sought.

Employment of commercial and graphic artists is expected to grow about as fast as the average for all occupations through the mid-1990's as advertising and design continue to expand with the economy and producers of information, goods, and services stress visual appeal. However, the supply of those seeking entry to this field will probably continue to exceed requirements. Those with above-average talent and a mastery of graphic art skills will continue to be in demand.

Earnings

The median earnings for salaried commercial and graphic artists and designers who usually work full time were about $17,900 a year in 1982. The middle 50 percent earned between $12,200 and $23,500 a year.

Those in entry level paste-up or layout jobs may make little more than the minimum wage. Art directors, by contrast, make $30,000-$40,000 or more per year. Earnings for freelancers vary widely. Those struggling to gain experience and a reputation may sometimes be forced to charge what amounts to less than the minimum wage for their work. Well-established freelancers are able to make a very comfortable living. Freelancers of course do not receive any of the usual fringe benefits such as health insurance or retirement benefits that salaried employees receive.

In 1982, Federal Government employees in art-related jobs earned an average salary of about $22,338 a year.

Related Occupations

Many occupations in the advertising industry, such as account executives or creative directors, are related to commercial and graphic art and design. Workers in other occupations in which visual art skills are applied are architects, display workers, floral designers, industrial designers, interior designers, landscape architects, and photographers. The various printing occupations are related to graphic art, as are teachers of art and design.

Sources of Additional Information

For additional information on graphic artists, write to:

The Graphic Artists Guild, 30 East 20th St., Room 405, New York, N.Y. 10003.

The National Art Education Association, 1916 Association Dr., Reston, Va. 22091.

Designers

(D.O.T. 141.051-010, and .137-010; and 142 except .061-038)

Nature of Work

Designers arrange and design articles, products, materials, and interiors so that they are not only functional, serving the purpose for which they were intended, but also visually pleasing. Products and packaging that are both functional and eye-catching are likely to attract more buyers than those that are not. Pleasant surroundings, beautiful clothes, and floral arrangements can boost our spirits.

Designers usually specialize in one type of product or activity, for example, automobiles, clothing, furniture, home appliances, industrial equipment, movie and theater sets, packaging, building interiors, or floral arrangements. In developing a new design or altering an existing one, they first determine the needs of their clients and potential users. Then they consider the size, shape, weight, color, materials used, and the way the product functions, as well as ease of maintenance, safety, and cost of the design. Designers may compare similar or competitive products. They take into account and often set style and fashion trends. Designers usually develop sketches of several designs which they present for final selection to an art or design director; a product development team; a play, film, or television producer; or a client. The designer then makes a model, a sample, or scaled detailed plans and drawings. Designers may also supervise craft workers who carry out their designs. Those with their own businesses also must find clients and do administrative work.

The design field includes a variety of specialties. *Industrial designers* (D.O.T. 142.061-026) develop and design countless manufactured products like cars, home appliances, computers, stethoscopes, filing cabinets, fishing rods, pens, and piggy banks. They combine artistic talent with research on product use, marketing, materials, and production methods to create the best and most appealing design and thereby make the product competitive with similar ones in the marketplace. *Package designers* (D.O.T. 142.081-018) create product containers that are not only attractive but easy to handle and store. *Graphic artists* (D.O.T. 141.061-022) draw or paint illustrations to advertise a product or an event. They also draw or design commercial logos such as corporate symbols or letterheads.

Interior designers (D.O.T. 142.051-014) plan, design, and furnish the interiors of private homes, public buildings, and commercial establishments like offices, restaurants, and theaters. They coordinate colors; select furniture, floor coverings, and curtain materials; and design lighting and architectural detail like crown molding. They sometimes renovate or make structural changes to old buildings.

Set designers (D.O.T. 142.061-046, -050) design movie, television, and theater sets. They study scripts, confer with directors, and conduct research to determine appropriate architectural styles.

Fashion designers (D.O.T. 142.061-018) design coats, suits, dresses, hats, handbags, shoes, gloves, jewelry, underwear, and other apparel. Some high-fashion designers are self-employed and design for individual clients. They make fashion news by establishing the "line," colors, and kinds of materials that will be worn each season. Other self-employed high-fashion designers cater to specialty stores or high-fashion department stores. They design original garments as well as follow the established fashion trends. Designers who work for apparel manufacturers do less original work; they adapt for the mass market the fashions set by other designers.

Cloth designers (D.O.T. 142.061-014) design fabrics for garments, upholstery, rugs, and other products, utilizing their knowledge of textile materials and fashion trends.

Memorial designers (D.O.T. 142.061-030) design memorials, mausoleums, statues, and monuments. Some memorial designers specialize in designing large-scale monuments that commemorate or honor people, places, or events.

Floral designers (D.O.T. 142.081-010) cut and arrange fresh, dried, or artificial flowers and foliage into a design to express the sentiments of the sender. They trim flowers and arrange bouquets, sprays, wreaths, dish gardens, and terrariums. They usually work from a written order indicating the occasion, customer preference for color and type of flower, price, and the date, time, and place the arrangement or plant is to be delivered. The variety of duties performed by a floral designer depends on the size of the shop and the number of designers employed. In a small operation, the floral designer may do almost everything from growing flowers to keeping books.

Working Conditions

Working conditions and places of employment vary, depending on the specialty. Designers employed by manufacturing establishments or design firms generally work regular hours in well-lighted and comfortable settings. Those who are self-employed usually work longer hours and are involved with a lot of paperwork in taking care of their business.

Industrial designers usually work regular hours and only occasionally work overtime to meet deadlines. Interior designers' hours are often long and irregular. They usually adjust their workday to suit their clients, meeting with them evenings or on weekends when necessary. They may transact business in clients' homes or offices, in their own offices, or in other locations such as decorator showrooms. Set designers, especially those in television broadcasting, often work long and irregular hours. Television production tempo is very fast and the set designers are often under pressure to make rapid changes in the sets. Fashion designers who work in the apparel industry usually have regular hours; however, their work may be seasonal and require long hours before fashion showings. Memorial designers spend most of their time in well-lighted and quiet settings similar to those of architectural drafting rooms. Some time is spent outdoors evaluating terrain for placement of memorials. Floral designers usually work regular hours, except during the holidays, when overtime may be required. Designers face frustration at times when their designs are rejected. Independent consultants, who are paid by the assignment, are under pressure to please clients and to find new ones to maintain their incomes.

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Employment

Designers held about 180,000 jobs in 1982. About two-fifths were in wholesale and retail trade—in florist shops, furniture and home furnishings stores, department stores, and apparel stores. More than one-fourth were in manufacturing industries—primarily machinery, motor vehicles and aircraft, apparel, metal products, instruments, printing and publishing, and textiles. Services industries, primarily business services and engineering and architectural firms, accounted for about 1 out of 10 jobs. Construction firms and government agencies also employed some designers. Self-employed designers accounted for about one sixth of all jobs.

Nearly all floral designers work in retail flower shops. Many florist shops are small and employ only a few designers. Many floral designers manage their own shops. Most interior designers work in design firms or as members of design departments of furniture stores. Some work for architects, furniture suppliers, antique dealers, and furniture and textile manufacturers. Most industrial designers work for consulting firms or large manufacturing companies. Some work for architectural firms or do freelance work. Fashion designers work in the apparel industry, privately owned salons, high-fashion department stores, and specialty shops. Some work for pattern manufacturers or as freelancers. Some fashion designers work in the entertainment industry designing costumes for theater, television, and movies. Memorial designers work for monument manufacturers, who are usually located near quarries. Set designers usually work for theater companies, the film industry, and television broadcasting.

Training, Other Qualifications, and Advancement

Artistic talent is crucial in all design occupations. People in this field need a strong color sense, an eye for detail, a sense of balance and proportion, and sensitivity to beauty. A good portfolio—a collection of examples of a person's best work—is sometimes more important in finding a job than formal education. However, formal training is becoming increasingly important for most designers. Almost 2 out of 3 designers entering the field in 1980 had a college degree or some college education. Industrial designers usually have 4 or more years of college.

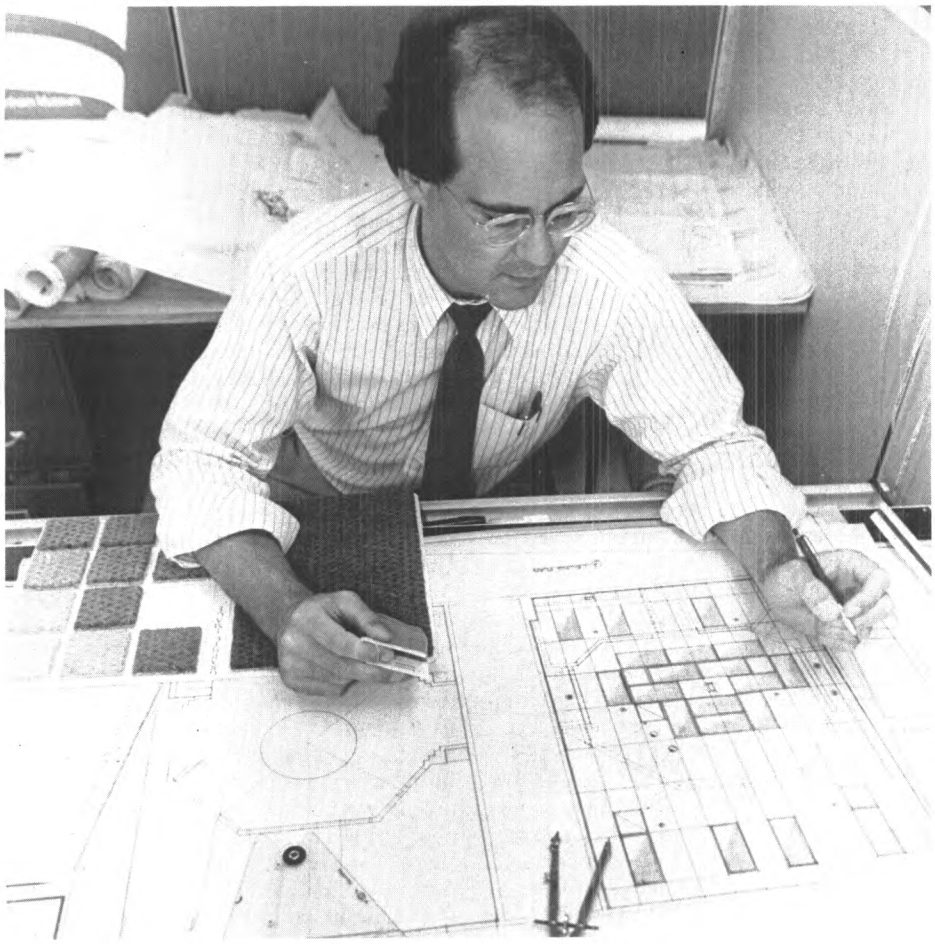
Formal training is available in 2- and 3-year professional schools which award certificates or associate degrees in design. Four-year colleges and universities grant the degree of Bachelor of Fine Arts. The curriculum in these schools includes art and art history, principles of design, fashion designing and sketching, garment construction, textiles, mechanical and architectural drawing, computerized design, sculpture, architecture, and basic engineering. A liberal arts education with courses in merchandising and business administration along with training in art is also a good background. Persons with training or experience in architecture also qualify for some design occupations.

In 1982, 31 colleges and art schools offered programs in design that were either accredited by the National Association of Schools of Art and Design or recognized by the Industrial Designers Society of America. Most of these schools award a degree in art, industrial design, interior design, graphic design, or fashion design. Many schools do not allow formal entry into a bachelor's degree program until a student has successfully finished a year of basic art and design courses. Applicants may be required to submit sketches and other examples of their artistic ability. Some colleges and universities offer degrees in floriculture and floristry and provide training in flower marketing and shop management. Junior colleges, adult education programs, and correspondence schools also offer courses in design. Floral designers may also get training in commercial floral design schools.

Regardless of the amount of formal training required, people in the design field must be creative, imaginative, persistent, and able to communicate their ideas visually. Because tastes in style and fashion can change quickly, people in this field need to be open to new ideas and influences. Problem-solving skills and the ability to work independently are important traits. People in this field need self-discipline to start projects on their own, and to budget their time in order to meet deadlines. Business sense and sales ability are important for those who are freelancers or run their own businesses.

Beginning designers are usually given on-the-job training. Usually a person can become a qualified floral designer after 2 years of on-the-job training; beginners in interior design usually need 1 to 3 years of training before they advance to designer. Experienced designers may advance to chief designer, design department head, or other supervisory positions. Some experienced designers open their own firms.

Although most States have no licensing requirements in the field, membership in the American Society of Interior Design (ASID) or the Institute of Business Designers is a recognized mark of achievement for interior designers. Membership usually requires the completion of 3 or 4 years of postsecondary school education in design, at least 2 years of practical experience in the field, and completion of a written and design-problem examination given by the National Council of Interior Design Qualification.



Designers need an eye for detail and a sense of balance and proportion.

Job Outlook

Employment in design occupations is expected to grow faster than the average for all occupations through 1995. However, most of the openings will result from the need to replace those who leave the field. Designers tend to leave the field at a somewhat higher rate than other professional and technical workers. Most who leave transfer to other occupations; others assume household responsibilities or retire.

Despite projected greater than average employment growth, persons seeking beginning

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jobs in most design fields, with the exception of floral design, are expected to face stiff competition through 1995. Many talented individuals are attracted to this field, and those with only average talent or without formal training are likely to find it difficult to find jobs.

Continued emphasis on product quality and safety, on design of new products for businesses and offices, and on high-technology products in medicine and transportation should expand the demand for industrial designers. Growth in population and personal incomes should increase the demand for interior designers, fashion designers, floral designers, and set designers. Memorial designers, especially those who design cemetery markers, are expected to have steady work with good job security.

Earnings

Median annual earnings of experienced full-time designers were almost $24,000 in 1982. Floral designers generally earned somewhat less than the median. Earnings of self-employed designers varied greatly, depending on their talent and business ability, but generally were higher than those of salaried designers.

Related Occupations

Workers in other occupations who design or arrange objects, materials, or interiors to improve their appearance and function include architects, engineers, photographers, merchandise displayers, fur designers, graphic designers, commercial artists, artists and art teachers, and manufacturers' sales workers who handle interior furnishings.

Sources of Additional Information

For information about careers in interior design, contact:

American Society of Interior Designers, 1430 Broadway, New York, N.Y. 10018.

For information about careers in floral arrangement, contact:

Society of American Florists, 901 North Washington St., Alexandria, Va. 22314.

For information about careers in memorial design, contact:

Monument Builders of North America, 1612 Central St., Evanston, Ill. 60201.

A brochure about careers and a list of schools offering courses and degrees in industrial design are available for $2 from:

Industrial Designers Society of America, 6802 Poplar Place, Suite 303, McLean, Va. 22101.

Photographers

(D.O.T. 143)

Nature of the Work

Photographers use their cameras and film to portray people, places, and events much as a writer uses words. Those who are skillful can capture the personality of individuals or the mood of scenes which they photograph. Photographers specializing in scientific, medical, or engineering photography expose worlds normally hidden from our view.

Although their subject matter varies widely, all photographers use the same basic equipment. The most important tool, of course, is the camera, and most photographers own several. Unlike snapshot cameras, which have a lens permanently attached to the camera body, the professionals' cameras are generally constructed to use a variety of lenses designed for close-up, medium-range, or distance photography.

Besides cameras and lenses, photographers use a variety of film and colored filters to obtain the desired effect under different lighting conditions. When taking pictures indoors or after dark, they may use electronic flash units, floodlights, reflectors, and other special lighting equipment.

Some photographers develop and print their own photographs in the darkroom and may enlarge or otherwise alter the basic image. Many photographers send their work to laboratories for processing.

Because the procedures involved in still photography are quite different from those in motion picture photography, many photographers specialize in one or the other. However, the demand is growing for photographers who have training in both areas.

In addition to the skilled use of cameras and accessories, photographers must be able to compose their pictures with creativity and to recognize a potentially good photograph.

Still photographers (D.O.T. 143.062-030) may specialize in a particular type of photography, such as portrait, fashion, or industrial work. Portrait photographers take pictures of individuals or groups of persons and often work in their own studios. For special events, such as weddings or christenings, however, they take photographs in churches and homes. Portrait photographers in small studios, like other small business owners, frequently handle all aspects of their business. They arrange for advertising and schedule appointments; set and adjust equipment before taking the pictures; develop and retouch negatives; develop proofs; and mount and frame pictures. They also purchase supplies and take care of the billing and recordkeeping.

Industrial photographers take pictures of a wide range of subjects including livestock, manufactured articles, buildings, and groups of people. They frequently do photography for catalogs. Companies use their work in publications to report to stockholders or to advertise company products or services. To create attractive, eye-catching promotional pictures, advertising photographers must command a broad array of photographic techniques. Industrial photographers also photograph groups of people for employee news magazines or take motion pictures of workers operating equipment and machinery for management's use in analyzing production or work methods.

Motion picture photographers (D.O.T. 143.062-022) may specialize in a particular subject material or field such as medical, scientific, news, or commercial. Some operate cameras in the motion picture industry.

Scientific photographers (D.O.T. 143.062-026) and *biological photographers* (D.O.T. 143.362-010) provide illustrations and documentation for scientific publications and research reports. The photographs and slides they

Industrial photographers may use special techniques to obtain information not visible under normal conditions.

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produce are also used for teaching purposes. These photographers usually specialize in a particular field, such as engineering, aerodynamics, medicine, biology, or chemistry. Some design photographic equipment for use as a research tool. For example, medical researchers often use ultraviolet and infrared photography, fluorescence, and X-rays to obtain information not visible under normal conditions. Time-lapse photography (where time is stretched or condensed), photomicrography (where the subject of the photography may be magnified 50 or 70 times or more), and photogrammetry (surveying an area using aerial photography) are other special techniques.

Photojournalists (D.O.T. 143.062-034) photograph newsworthy events, places, people, and things for publications such as newspapers and magazines or for television news shows. They may also prepare educational slides, filmstrips, and movies.

Working Conditions

Working conditions for photographers vary. Those who have salaried jobs usually work a 5-day, 35- to 40-hour week. Photographers in business for themselves may work longer or more irregular hours. Many photographers work part time.

Freelance, press, and commercial photographers may travel frequently and may work in uncomfortable surroundings. Sometimes the work can be dangerous, especially for photojournalists assigned to cover stories on natural disasters or military conflicts.

Many photographers work under pressure. Deadlines and demanding customers must be satisfied. Freelance photographers may find soliciting new clients frustrating and tedious.

Employment

Photographers held about 86,000 jobs in 1982. Nearly 6 of every 10 jobs were salaried positions. The rest were held by self-employed photographers who do individual projects for those wishing to use their services. Photographic or commercial art studies provided the most jobs; other employers included newspapers, magazines, radio and television broadcasters, motion picture companies, government agencies, and manufacturing firms. Some photographers were employed by colleges, universities, and other educational institutions to prepare promotional and educational materials.

Jobs for photographers are found in all parts of the country—both small towns and large cities—but are concentrated in the more populated areas.

Training, Other Qualifications, and Advancement

Although a high school education is desirable, entry level jobs for photographers have no formal education or training requirements. Employers usually seek applicants who have a broad technical understanding of photography as well as other photographic talents, such as imagination, creativity, and a good sense of timing. Technical expertise can be obtained through practical experience, postsecondary training, or some combination of the two. Some jobs do require that applicants have specialized knowledge of the subject areas that will be photographed.

Photographic training is available in colleges, universities, junior colleges, public vocational education programs, and private photography and art schools. About 75 colleges and universities offered 4-year curriculums leading to a bachelor's degree in photography in 1982. Many schools offer photography training as part of their communications and journalism programs. Some colleges and universities grant master's degrees in photography. In addition, some colleges have 2-year curriculums leading to a certificate or an associate degree in photography. A formal education in photography gives a fundamental background in a variety of equipment, processes, and techniques. Art schools offer useful training in design and composition, but not the technical training needed for professional photographic work. The Armed Forces also train people in photographic skills.

People may prepare for work as photographers in a commercial studio through 2 or 3 years of on-the-job training as a photographer's assistant. Trainees generally start in the darkroom where they learn to mix chemicals, develop film, and do photoprinting and enlarging. Later they may set up lights and cameras or help an experienced photographer take pictures.

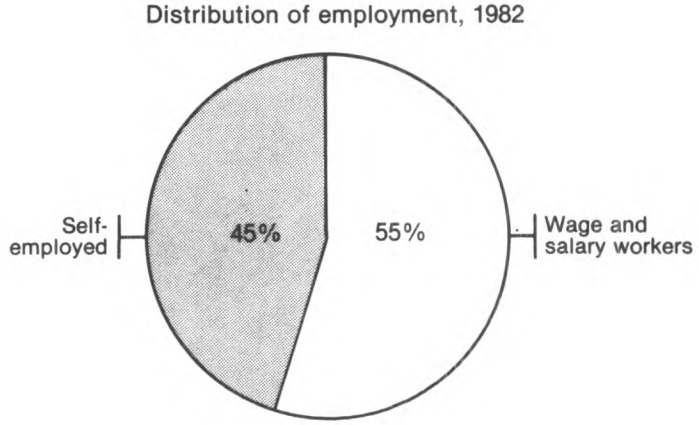
Amateur experience is helpful in getting an entry job with a commercial studio, but post-high school education and training usually are needed for industrial or scientific photography. Here success in photography depends on being more than just a competent photographer, and adequate career preparation requires some knowledge of the field in which the photography is used.

Photographers must have good eyesight and color vision, artistic ability, and manual dexterity. They should be patient, accurate, and enjoy working with detail. Some knowledge of mathematics, physics, and chemistry is helpful for understanding the use of various lenses, films, light sources, and development processes.

Some photographic specialties require additional qualities. Commercial or freelance photographers must be imaginative and original in their thinking. Those who specialize in photographing news stories must recognize a potentially good photograph and act quickly; otherwise, an opportunity to capture an important event on film may be lost. Writing ability sometimes is important for photojournalists, who may write captions and accompanying articles for their photographs. Portrait photographers need the ability to help people relax in front of the camera.

Newly hired photographers are given relatively routine assignments that do not require split-second camera adjustments or decisions on what subject matter to photograph. News photographers, for example, may be assigned to cover events such as civic meetings or snowstorms. After gaining experience,they advance to more demanding assignments, and may move to larger newspapers or magazines. A few gain national recognition for their work and exhibit their photographs in art and photographic galleries, or publish them in books. A few industrial or scientific photographers may be promoted to supervisory positions. Magazine and news photographers may eventually become heads of graphic arts departments or photography editors.

Almost half of all photographers are self-employed.



SOURCE: Bureau of Labor Statistics

Job Outlook

Employment of photographers is expected to grow more slowly than the average for all occupations through the mid-1990's. In addition to openings resulting from increased demand for photographers, others will occur each year as workers transfer to other occupations, retire, or die.

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Demand will be stimulated as business and industry place greater importance upon visual aids in meetings, stockholders' reports, sales campaigns, and public relations work. Photography is becoming an increasingly important part of law enforcement work, as well as scientific and medical research, where opportunities are expected to be good for those with appropriate technical skills. Employment in photojournalism is expected to grow slowly.

Employment of portrait and commercial photographers is also expected to grow slowly, and competition for jobs is expected to remain keen. These fields are relatively crowded since amateur photographers can go into business for themselves with a modest financial investment, or work part time while holding another job. Increased use of self-processing cameras in commercial photography has contributed to crowding in this field, since little training is required for such work.

Earnings

Photographers in private industry who did relatively routine work averaged $20,439 a year in early 1982; those at mid-level averaged $24,425; and those doing difficult work, $26,815.

In early 1983, beginning photographers who worked for newspapers that have contracts with The Newspaper Guild had weekly earnings between $175 and $692, with the majority of beginning photographers earning between $275 and $350. Newspaper photographers with some experience (usually 4 or 5 years) averaged about $480 a week in early 1983. Almost all experienced newspaper photographers earned over $350; the top salary under Guild contracts with daily newspapers was $721 a week.

Photographers in the Federal Government earned an average of $21,504 a year in 1982. Scientific photographers averaged $33,296.

Some self-employed and freelance photographers earn more than salaried workers. Many self-employed photographers, however, earn very little from their photography work. Earnings of freelancers are affected greatly by general business conditions and the type and size of their community and clientele.

Related Occupations

Besides photographers, other workers who rely on their visual arts talents in their jobs include commercial artists, floral designers, illustrators, industrial designers, painters, and sculptors.

Sources of Additional Information

Career information on photography is available from:

Professional Photographers of America, Inc., 1090 Executive Way, Des Plaines, Ill. 60018.

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Performing Artists

The excitement of opening night, the thrill of an audience's applause, the joy of public recognition and admiration—these are some inducements for people to enter the performing arts. The opportunity for creative self-expression and the development of one's artistic talents are other reasons why some people become performing artists.

The performing arts include acting, dancing, instrumental music, and singing. These fields have the common goals of entertaining, communicating with, and affecting the emotions of audiences. All of a performer's work depends entirely upon his or her personal qualities—such as speech, appearance, facility in body movement, finger dexterity, and mental capacities.

Most aspiring artists spend many years in intensive training and practice before they are ready for professional performances. They not only need great natural talent but also determination, a willingness to work long and hard in their chosen field, and some luck.

Within the performing arts, the number of talented persons seeking employment generally exceeds by far the number of positions available. As a result, many performers are not able to find enough work in their field to be employed full time all year long. Many supplement their incomes by teaching, or work much of the time in occupations unrelated to the performing arts. Only the most successful performers can earn a living solely from their art; therefore, persons interested in these careers may wish to consider training for a backup or alternative field of work.

The statements that follow give detailed information on actors and actresses, dancers, musicians, and singers.

Actors and Actresses

(D.O.T. 150.047-010; 159.044-010, 047-010, -014, -018, -022; and 961.367-010)

Nature of the Work

Actors and actresses entertain and communicate with people through their interpretation of dramatic roles. They rely on facial and verbal expression as well as body motions for their creative effect.

Making a character come to life before an audience is a job that has great glamour and fascination. However, acting requires persistence, practice, and hard work, as well as a special talent. Only a few actors and actresses achieve recognition as stars on the stage, in motion pictures, or on television. 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 pick up parts wherever they can. Employment for actors is characteristically unsteady. Most actors experience frequent periods of unemployment, and many take temporary jobs, often as waiters or sales workers, while waiting for their next acting parts to come along.

Beginning stage actors generally start in "bit" parts where they speak only a few lines. If successful, they may progress to larger, supporting roles. They frequently serve as understudies for the principals. Film and television actors, in contrast, may begin in large roles or move into programs from working in commercials.

In addition to the actors and actresses with speaking parts, "extras," who have no lines to deliver, are used in almost all motion pictures and many television shows and theater productions.

Some actors move into acting-related jobs as drama coaches or directors of stage, television, radio, or motion picture productions. A few teach drama in colleges and universities, where they usually specialize in a particular aspect of drama, such as stage movement, stage speech and voice, or acting. Some professional actors employed by theater companies also teach acting in courses offered to the public.

Working Conditions

Acting demands patience and total commitment, since aspiring actors and actresses must wait for parts or filming schedules, work long hours, and travel often. Evening work is a regular part of a stage actor's life. Flawless performances require the tedious memorizing of lines and repetitive rehearsals—sometimes late at night after performances. Performances on television programs often allow little time for rehearsal, so that the actor must deliver a good performance with very little preparation. An actor needs stamina to withstand the heat of stage or studio lights, the long irregular hours, and the adverse weather conditions that may exist "on location." When plays are on the road, weekend traveling often is necessary.

Employment

At any one time in 1982, actors and actresses held an average of about 34,000 jobs in motion pictures, stage plays, industrial shows, and commercials. Many others were between acting jobs, so that the total number of people actually employed as actors and actresses over the course of the year was higher. In the winter, most employment opportunities on the stage are in New York and other large cities. In the summer, stock companies in suburban and resort areas provide employment. In addition, many cities have "little theaters," repertory companies, and dinner theaters, which provide opportunities for local amateur talent as well as for professional actors and actresses. Normally, casts are selected in New York City for shows that go "on the road."

Employment in motion pictures and films for television is 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 and employ local professionals and nonprofessionals as "day players" and "extras." A number of American-produced films are 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

Aspiring actors should take part in high school and college plays, or work with little theaters and other acting groups for experience.

Some people do enter the field without formal training in acting. However, formal training or acting experience is generally necessary. Training in dramatic arts can be obtained at specialized schools in New York and Los Angeles, and at about 620 colleges and universities throughout the country offering bachelor's or higher degrees in dramatic and theater arts. College drama curriculums usually include courses in liberal arts, stage speech and movement, directing, playwriting, 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 the roles he or she may play.

In all media, the best way to start is to use local opportunities and to build on them. Many actors who are successful in local and regional productions eventually try to obtain work in New York or Los Angeles. Modeling experience may also be helpful in obtaining employment in television or motion pictures. Persons who plan to pursue an acting career need talent, creative ability, and training that will enable them to portray different characters. They must have poise, stage presence, and the ability to affect an audience. At the same time, the ability to follow directions is important. Physical appearance is often a deciding factor in being selected for particular roles. Actors should be prepared to face the anxiety of intermittent employment and rejections when auditioning for work.

Many actors rely on agents or managers to find them performing engagements, negotiate contracts, and plan their careers.

To become a movie extra, one must usually be listed by a casting agency, such as Central

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There is keen competition for acting jobs.

Casting, a no-fee agency that 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. An actor employed as an extra in a film has very little opportunity to advance to a speaking role in that film.

The length of a performer's working life depends largely on training, skill, versatility, and perseverance. Some actors and actresses work almost indefinitely. Many actors leave the occupation, however because they cannot find enough acting work to make a living.

Job Outlook

The large number of people desiring acting careers, the lack of formal entry requirements, and the relatively small number of job openings cause keen competition for acting jobs. Only the most talented find regular employment. Through the mid-1990's, many openings will occur as actors leave the occupation. In addition, faster than average growth in employment is expected, in commercial theaters, non-profit acting companies, and television. Nevertheless, there are not expected to be openings for all jobseekers, and the keen competition for acting jobs is expected to continue.

Earnings

Actors and actresses who appear on the stage belong to the Actors' Equity Association; in motion pictures, including television films, to the Screen Actors Guild, Inc. or to the Screen Extras Guild, Inc.; and in television or radio, to the American Federation of Television and Radio Artists (AFTRA). These unions and the producers of the shows sign basic collective bargaining agreements which set minimum salaries, hours of work, and other conditions of employment. Each actor also signs a separate contract, which may provide for a higher salary than that specified in the basic agreement.

The minimum weekly salary for actors in Broadway productions was about $575 in 1982. Those in small "off-Broadway" theaters received minimums ranging from $180 to $300 a week, depending on the seating capacity of the theater. For shows on the road, the minimum rate was $47 extra per day.

In 1982, motion picture and television actors and actresses earned a minimum daily rate of $298, or $903 for a 5-day week. For extras, the minimum rate was $83 a day. Television actors also receive additional compensation for reruns.

However, earnings of most actors and actresses from acting work are low because their employment is irregular. According to data from Actors Equity Association, which represents about 30,000 actors in the legitimate theater, about 15,000 of their members had no earnings in 1982; 6,000 members made less than $5,000; 3,600 members earned between $5,000 and $30,000; and only 400 members earned more than $30,000. The Screen Actors Guild, which has over 40,000 members, reports that over 80 percent earned less than $5,000 from acting jobs in 1982; fewer than 5 percent earned $25,000 or more. Therefore, many actors must supplement their incomes from acting by maintaining other, nonacting jobs.

Some well-known actors and actresses who have salary rates above the minimums, and the 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. After the show opens, the basic workweek is 36 hours, including 12 hours for rehearsals. Before it opens, however, the workweek usually is longer to allow time for rehearsals.

Many actors who earn more than a set minimum per year are covered by a union health, welfare, and pension fund, including hospitalization insurance, to which employers contribute. Under some employment conditions, 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.

Related Occupations

Actors and actresses entertain people through their interpretations of dramatic roles by facial and verbal expression and body motions. Related occupations for people with these skills include dancers, choreographers, disc jockeys, drama teachers or coaches, narrators, and radio and television announcers. Other people working in theatrical occupations related to acting are playwrights, directors, script writers, stage managers, and set designers. Occupations involved with the business aspects of theater productions include producers, touring managers, booking managers, and actors' agents.

Sources of Additional Information

Information on colleges and universities and conservatories that offer a major in drama is available from:

American Theater Association, 1000 Vermont Ave. NW., Washington, D.C. 20005.

Information about nonprofit regional theaters may be obtained from:

Theater Communications Group, Inc., 355 Lexington Ave., New York, N.Y., 10017.

Information about grants made in the performing arts is available from:

Information Office, National Endowment for the Arts, 2401 E St. NW., Washington, D.C. 20506.

League of Professional Theatre Training Programs, Suite 1515, 1860 Broadway, New York, N.Y. 10023.

Dancers

(D.O.T. 151.027-010, and .047-010)

Nature of the Work

Dancing is an ancient and worldwide art used to interpret an idea or a story, or simply to physically express rhythm and sound. Many professional dancers perform in classical ballet, which includes the stylized, traditional repertory, in or modern dance, which allows more free movement and self-expression. Others perform in dance adaptations for musical shows, in folk,

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ethnic, and jazz dances, and in other popular kinds of dancing. In addition to being an art form for its own sake, dance also is used to complement opera, musical comedy, and television performances.

In dance productions, performers most often work as a group, although a few top artists dance solo. Many dancers combine stage work with teaching. Some dancers create (choreograph) original dances, teach them to performers, and sometimes direct and stage the presentations of their work.

Working Conditions

Dancing is strenuous. Rehearsals require very long hours and usually take place daily, including weekends and holidays. For shows on the road, weekend travel often is required. Most performances take place in the evening, and dancers must become accustomed to working late hours. Therefore, many dancers, by their thirties, transfer to related occupations such as choreographer or dance teacher or find work in other occupations. Certain celebrated dancers, however, continue performing beyond the age of 50.

Employment

Professional dancers held an average of about 8,000 jobs at any one time in 1982. Many others were between engagements so that the total number of people employed as dancers over the course of the year was greater. In addition, in 1982, there were about 23,000 dance instructors in secondary schools, colleges and universities, dance schools, and private studios. Of these, many also worked from time to time as performers themselves.

New York City is the home for about one-half of the major dance companies. Other cities with full-time dance companies are Los Angeles, San Francisco, Seattle, Chicago, Dallas, Houston, Salt Lake City, Cincinnati, Cleveland, Boston, Philadelphia, and Atlanta.

Training and Other Qualifications

Serious training for a career in dancing traditionally begins by about age 12. Early ballet training begins at age 7 or 8 and is usually given by private teachers and independent ballet schools. Students who demonstrate potential in the early teens receive more intensive and advanced professional training at regional ballet schools or schools conducted under the auspices of the major ballet companies. Leading dance school companies often have summer training programs from which they select candidates for admission to their regular full-time training program. Early and intensive training also is important for the modern dancer, but modern dance does not require as many years of training as ballet. Most dancers have their professional auditions by age 17 or 18, but training and practice never end. For example, professional ballet dancers take from 10 to 12 lessons a week for 11 or 12 months of the year, and must spend many additional hours practicing and rehearsing.

Because of the strenuous and time-consuming training required, a dancer's general education may be minimal. However, a broad, general education including music, literature, history, and the visual arts gives a background helpful in the interpretation of dramatic episodes, ideas, and feelings.

About 210 colleges and universities confer bachelor's or higher degrees in dance, generally through the departments of physical education, music, theater, or fine arts. Most programs concentrate on modern dance, but also offer courses in ballet/classical techniques.

A ballet dancer needs agility, grace, and a sense of rhythm.

A college education is not essential to obtaining employment as a professional dancer. In fact, ballet dancers who postpone their first audition until graduation may compete at a disadvantage with younger dancers. On the other hand, a college degree can be helpful for the dancer who retires at an early age, as often happens, and wishes to enter another field of work.

Although a college education is an advantage for college or university teaching, it is not necessary for teaching dance or choreography in a studio. Studio schools usually require teachers to have experience as performers; colleges and conservatories generally require graduate degrees, but performance experience 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; therefore, patience, perseverance, and a devotion to dance are essential. Good health and physical stamina are necessary in order to practice and perform and to follow the rugged travel schedule often required.

Seldom does a dancer perform unaccompanied. Therefore, ability to function as part of a team is important. Dancers also should be prepared to face the anxiety of intermittent employment and rejections when auditioning for work.

Body height and build should not vary much from the average. Good feet and normal arches also are required. Above all, one must have agility, coordination, grace, a sense of rhythm, and a feeling for music, as well as a creative ability to express oneself through movement. Many dancers retire in their thirties or transfer to related fields such as teaching dance or becoming choreographers or dance directors.

Job Outlook

The large number of people seeking professional dancing careers and the relatively small number of job openings cause keen competition for dancing jobs. Only the most talented find regular employment. Through the mid-1990's, some job openings will occur as dancers leave the occupation. In addition, employment of dancers is expected to grow faster than the average for all occupations with new professional dance companies, dance groups affiliated with colleges and universities, and in television. Nevertheless, there are not likely to be openings for all jobseekers, and keen competition is expected to continue.

Earnings

Some dancers in the major opera ballet, classical ballet, and modern dance belong to the American Guild of Musical Artists, Inc.; those on live or videotaped television belong to the American Federation of Television and Radio Artists; those who perform in films and TV belong to the Screen Actors Guild or the Screen Extras Guild; and those in musical comedies join Actors' Equity Association. The unions and producers sign basic agreements specifying minimum salary rates, hours of work, and other conditions of employment. However, the separate contract signed by each dancer with the

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producer of the show may be more favorable than the basic agreement. Most dancers who have only occasional professional engagements are not represented by any unions.

In 1982, the minimum salary for dancers in opera and other stage productions was $60 per performance. The single performance rate for ballet dancers was $130. Dancers on tour received an allowance of $60 a day in 1982 for room and board. Minimum performance rates for dancers on television ranged from $475 to $486 for a 1-hour show, depending on the number of dancers in the group. The performance rate covers 18 hours of rehearsal over a 3-day period, in addition to the performance. The normal workweek is 30 hours (6 hours per day maximum) spent in rehearsals and matinee and evening performances. Extra compensation is paid for additional hours worked.

However, the earnings of most dancers from dancing are low because their employment is irregular. They often must supplement their incomes by taking temporary jobs unrelated to dancing.

Dancers covered by union contracts are entitled to some paid sick leave and various health and welfare benefits provided by their unions. Employers contribute toward these benefits. Most other dancers do not receive any fringe benefits.

Related Occupations

Dancers express concepts and emotions through their body movements. They need grace, rhythm, and body control. Some related occupations which utilize actual training in dance or specialized knowledge of dance forms include acrobats, athletes, dance critics, dance instructors, dance notators, dance therapists, and recreation workers.

Sources of Additional Information

A list of colleges and universities that teach dance, including details on the types of courses offered, is available from:

National Dance Association, a Division of the American Alliance for Health, Physical Education, Recreation, and Dance, 1900 Association Dr., Reston, Va. 22091.

For information on all aspects of dance, including job listings, contact:

American Dance Guild, 570 7th Ave. 20th Fl., New York, N.Y. 10018. Enclose a stamped, self-addressed envelope.

Information about the related field of dance therapy, along wih a list of schools that offer degrees in the field, is available from:

American Dance Therapy Association, Suite 230, 2000 Century Plaza, Columbia, Md. 21044.

Musicians

(D.O.T. 152.041-010, .047-014, and -018)

Nature of the Work

The wide variety and appeal of music make it difficult to imagine a world without musicians. Professional musicians—those whose livelihoods depend upon performing for others—may play in a symphony orchestra, dance band, rock group, or jazz "combo." Whether their specialty is classical or popular music, they all have behind them many years of study and practice.

Popular music performers usually play the trumpet, trombone, clarinet, flute, saxophone, organ, or one of the "rhythm" instruments—the piano, string bass, drums, or guitar. Most play engagements in nightclubs and restaurants, for musical comedies, in concerts, and at weddings and other special events. The best known artists sometimes perform on television.

Classical musicians play in symphony, opera, ballet, and theater orchestras, in churches and synagogues, and for other groups that require orchestral accompaniment. Some form small chamber music groups—usually quartets or trios. Classical musicians play string, brass, woodwind, or percussion instruments. Many pianists accompany vocal or instrumental soloists, choral groups, or provide background music in restaurants or other places. Most organists play in churches; often they direct the choir.

A few well-known musicians give their own concerts, appear as soloists with symphony orchestras, and make recordings.

Working Conditions

Musicians generally perform at night and on weekends, and also spend time in practice and rehearsal. Performances often require travel. Many musicians find only part-time work or experience unemployment between engagements. They often supplement their incomes with other types of jobs.

Employment

Performing musicians held an average of about 124,000 jobs at any one time in 1982. Others were between engagements, so that the total number of people employed as musicians during the course of the year was greater.

Many work in cities in which entertainment and recording activities are concentrated, such as New York City, Chicago, Los Angeles, Nashville, Miami Beach, and New Orleans. Many classical musicians perform with one of the 31 major symphony groups, the 29 regional orchestras, the 115 metropolitan orchestras, or the hundreds of other orchestras. Many musicians also work in smaller cities and towns, playing in churches, clubs, and restaurants, and for weddings and other events. The Armed Forces, too, offer careers in their musical organizations.

Training and Other Qualifications

Many people who become professional musicians begin studying an instrument at an early age. Intensive training is needed to acquire the necessary skill, knowledge of music, and ability to interpret music. This training may be obtained through private study with an accomplished musician, in a college or university music program, in a music conservatory, or through practice with a group. For study in an institution, an audition frequently is necessary. Many teachers in these schools are accomplished artists who will train only promising young musicians.

About 500 colleges, universities, and music conservatories offer bachelor's or higher degrees in music. About 600 conservatories and colleges and universities offer a bachelor's degree in music education to qualify graduates for a State certificate to teach in an elementary or secondary school.

Those who play popular music must have an understanding of and feeling for that style of music, but classical training may expand their employment opportunities. As a rule, they take lessons with private teachers when young, and seize every opportunity to make amateur or professional appearances. As they gain experience and become known, they perform with better known bands and orchestras.

Most entrants to the occupation do not have a college degree. However those with a degree are more likely to work full time than those who do not.

Young persons who consider careers in music should have musical talent, versatility, creative ability, and poise and stage presence to face large audiences. Since quality performance requires constant study and practice, self-discipline is vital. Moreover, musicians who play concert and nightclub engagements must have physical stamina because of frequent traveling and night performances. They must also be prepared to face the anxiety of intermittent employment and rejections when auditioning for work.

Many musicians rely on agents or managers to find them performing engagements, negotiate contracts, and plan their careers.

Job Outlook

The large number of people desiring to be professional musicians, the lack of formal entry requirements for many types of jobs, and the

To be a musician requires constant study and practice, creative ability, and stage presence.

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relatively small number of job openings cause keen competition for jobs. Only the most talented find regular employment. Through the mid-1990's, many openings will occur as musicians leave the occupation. In addition, employment is expected to grow about as fast as the average for all occupations. However, there are not likely to be openings for all jobseekers, and the keen competition for jobs as a musician is expected to continue.

Earnings

Earnings often depend on a performer's professional reputation as well as on geographic location—and on the number of hours worked. In 1982, median earnings for salaried musicians who usually work full time were about $410 a week. The middle 50 percent earned between $300 and $520 a week.

Minimum salaries for musicians in major symphony orchestras in 1982 ranged from $300 to $650 a week, according to the American Symphony Orchestra League. Minimums in the regional symphony orchestras ranged from about $120 to $415 a week. Minimum wages for musicians in metropolitan symphony orchestras were generally between $6 and $45 per rehearsal and $16 to $58 per concert. Some musicians earned substantially more than the minimums, however.

The major symphony orchestras have seasons ranging from 31 to 52 weeks, with an average of 48 weeks. Metropolitan and regional orchestras generally have shorter seasons.

Musicians in large metropolitan areas who had steady engagement contracts to play at dances, clubs, variety shows, ballets, musical comedies, and concerts generally earned minimums ranging from $10 to $25 per hour in 1982. Wages for similar engagements in smaller cities and towns tended to be less. Musicians employed in motion picture recording earned a minimum of about $150 for a 3-hour session; those employed in television commercials earned a minimum of $76 each for two to four musicians and $140 each for more than five musicians for a 1-hour session. Musicians employed by recording companies were paid a minimum of about $170 for a 3-hour session in 1982.

Musicians employed by some symphony orchestras work under master wage agreements, which guarantee a season's work up to 52 weeks. Many other musicians may face relatively long periods of unemployment between jobs. Even when employed, however, many work part time. Thus, their earnings generally are lower than those in many other occupations. Moreover, since they may not work steadily for one employer, some performers cannot qualify for unemployment compensation, and few have either sick leave or vacations with pay. For these reasons, many musicians give private lessons or take jobs unrelated to music to supplement their earnings as performers.

Many musicians belong to a branch of the American Federation of Musicians, an AFL-CIO union. Concert soloists may also belong to the American Guild of Musical Artists, Inc. (AFL-CIO).

Related Occupations

Aside from actual performers, there are many music-related occupations. These include arrangers, composers, orchestrators, librettists, and music therapists. A large number of music teachers work in elementary and secondary schools, music conservatories and college and universities, or are self employed. Many who teach music also perform.

A technical knowledge of musical instruments is required by instrument repairers, tuners, and copyists. In addition, there are a number of occupations in the business side of music such as booking agents, concert managers, music store owners and managers; salespersons of records, sheet music, and musical instruments; and music publishers. Others whose work involves music are disc jockeys, music critics, sound and audio technicians, music librarians, and radio and TV announcers.

Sources of Additional Information

For answers to specific questions about wages, hours of work, and working conditions for professional musicians, contact:

American Federation of Musicians (AFL-CIO), 1500 Broadway, New York, N.Y. 10036.

The requirements for certification of organists and choir masters are available from:

American Guild of Organists, 815 Second Ave., Suite 318, New York, N.Y. 10017.

For information about a career in music therapy, contact:

National Association for Music Therapy, Inc., P.O. Box 610, Lawrence, Kans. 66044.

For programs in music teacher education, contact:

Music Educators National Conference, 1902 Association Dr., Reston, Va. 22091.

Information about certification of private music teachers is available from:

Music Teachers National Association, 2113 Carew Tower, Cincinnati, Ohio 45202.

A list of accredited schools of music is also available for $6 from:

National Association of Schools of Music, 11250 Roger Bacon Dr., Reston, Va. 22090.

A brochure entitled *Careers in Music*, produced jointly by the three organizations listed above, is available from any of the three.

Information about careers in orchestra management is available from:

American Symphony Orchestra League, P.O. Box 669, Vienna, Va. 22180.

Singers

(D.O.T. 152.047-022)

Nature of the Work

Singing is an age-old form of entertainment which, in one form or another, can be understood and appreciated by almost everyone. Singers interpret music using their knowledge of voice production, melody, and harmony. They sing character parts or perform in their own individual styles. Singers are classified according to their voice range—soprano, contralto, tenor, baritone, or bass, or by the type of music they sing, such as opera, rock, folk, or country and western.

A small number of singing stars make recordings or go on concert tours. Somewhat larger numbers of singers obtain leading or supporting roles in operas and popular music shows, secure engagements as concert soloists in oratorios and other types of performances, or become members of opera and musical comedy choruses and other professional choral groups. Popular music singers perform in movies, on the stage, on radio and television, in concerts, and in nightclubs and other places of entertainment.

Working Conditions

Singers generally perform at night and on weekends, and must also practice and attend rehearsals. Except for a few well-known performers, few singers have steady jobs. Most experience some unemployment between engagements, or have to supplement their incomes with other kinds of jobs. Moreover, a singing career sometimes is relatively short since it depends on a good voice, physical stamina, and public acceptance of the artist, all of which may be affected by age.

Employment

At any one time in 1982, professional singers held an average of about 21,000 jobs. Many others were between singing jobs, so that the total number of people employed as singers over the course of the year was greater. Opportunities for singing engagements are concentrated in New York City, Los Angeles, Las Vegas, San Francisco, Dallas, and Chicago—the Nation's chief entertainment centers. Nashville is a major center for performances and recordings by country and western singers. Many singers also work part time in church and synagogue choirs, or give private singing lessons.

Many other people with singing backgrounds are employed as music teachers in elementary and secondary schools, colleges, universities, and conservatories, and as choirmasters in church and synagogue choirs. (See the statements on teachers elsewhere in the *Handbook*.)

Training and Other Qualifications

A broad background in music, including its theory and history, is desirable, although not essential, for all types of singing. The ability to dance also may be helpful for some jobs. In addition, knowing how to play the piano may be an asset. As a rule, voice training should not begin until after the individual has matured physically. An audition often is required for advanced voice training. Voice training often continues for years after a singer's professional career has started.

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Training for singers of classical music is available through private voice lessons and degree programs in music conservatories or departments of music in colleges and universities. These schools provide voice training, and also training in music interpretation, music-related foreign languages, and, sometimes, dramatics. Four-year programs grant a bachelor of music, bachelor of science or arts (in music), or bachelor of fine arts. Those who plan to teach singing in public schools need at least a bachelor's degree in music and must meet the State certification requirements for teachers. About 600 conservatories, colleges, and universities offer a degree program in music education; about 500 offer bachelor's degrees in music.

Although voice training is an asset for singers of popular music, many with untrained voices have successful careers. The typical popular song does not require a voice with as wide a range as is required for classical music, and the lack of voice projection may be overcome with a microphone.

Singers of popular songs may become known by participating in local amateur shows or performances. These engagements may lead to employment with local dance bands or rock groups and possibly later with better known ones.

Besides musical ability, a singing career requires an attractive appearance, poise and stage presence, and perseverance. Singers also must have physical stamina to adapt to frequent traveling and rigorous time schedules, which often include night performances. They also must be prepared to face the anxiety of intermittent employment and rejections when auditioning for work.

Many singers rely on agents to find them performing engagements, negotiate contracts, and plan their careers.

Job Outlook

The large number of people desiring singing careers, the lack of formal entry requirements for many types of singers, and the relatively small number of job openings cause keen competition for singing jobs. Only the most talented find regular employment. Through the mid-1990's, some openings will occur as singers leave the occupation. In addition, growth in employment is expected in opera, theater, nightclubs, and other areas. However, there are not likely to be openings for all jobseekers, and the keen competition for singing jobs is expected to continue.

A successful singing career depends on a good voice, physical stamina, and public acceptance.

Earnings

The union minimum rate for concert singers who were part of a chorus was $75 per performance in 1982. Members of an opera chorus earned a minimum daily rate of $55 per performance. A featured soloist received a minimum of $200 for each single performance. A few opera soloists and popular singers, however, earned thousands of dollars per performance. Minimum wage rates for group singers on network or syndicated television ranged between $213 and $227 per singer for a 1-hour show. Solo or duo singers received minimums of about $460 each for a 1-hour TV show. The minimum scale for phonograph recording artists is $100 per side. However, earnings of most singers from singing are low because their employment is irregular.

Professional singers usually belong to a branch of the Associated Actors and Artistes of America, an AFL-CIO union. The branch for singers on the concert stage or in opera is the American Guild of Musical Artists, Inc.; for those who sing on radio or television or make recordings, the American Federation of Television and Radio Artists; for singers in the variety and nightclub field, the American Guild of Variety Artists; for those in musical comedy and operettas, the Actors' Equity Association; and for those on television or in motion pictures, the Screen Actors Guild, Inc.

Related Occupations

Others who have careers concerned with vocal music include composers, arrangers, orchestrators, and songwriters, as well as voice and music teachers, choir directors, and music therapists. There are many occupations in the business and technical side of music, such as artists' managers, business managers, booking managers, sound controllers, audio operators, sound recording technicians, and music librarians.

Sources of Additional Information

A directory of accredited schools and departments of music is available for $6 from:

National Association of Schools of Music, 11250 Roger Bacon Dr., Reston, Va. 22090.

For information regarding programs in music teacher education, contact:

Music Educators National Conference, 1902 Association Dr., Reston, Va. 22091.

Information about certification of private music teachers is available from:

Music Teachers National Association, 2113 Carew Tower, Cincinnati, Ohio 45202.

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OTHER WRITING, ART, AND ENTERTAINMENT RELATED OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Athletes	Participate in competitive athletic events; play games or engage in sports according to established rules. Train through physical exercise and practice. May be designated according to sport in which individual participates.	23,000	More slowly than average
Merchandise displayers and window trimmers	Includes workers concerned with planning and executing commercial displays, such as those in windows and interiors of retail stores and those used in trade exhibitions.	27,000	Faster than average
Painters, artistic	Paint landscapes, portraits, still life, abstract designs, and similar compositions in oils, watercolors, or tempera. May paint scenery, back drops and other parts of motion picture or stage sets.	25,000	More slowly than average
Sports instructors	Teach individuals or groups in sports such as golf, tennis, skiing, bowling, etc., explaining and demonstrating the sports' techniques and methods. Observe students and inform them of action required to correct mistakes.	53,000	About as fast as average

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Technologists and Technicians, Except Health

Technologists and technicians provide the technical assistance necessary for engineering, computer, library, legal, and similar professional activities. They focus on the practical elements of a job, leaving the policy, theory, and design aspects to others.

Technologists and technicians perform the day-to-day tasks needed to carry out a project or run an operation. They may operate testing and measuring equipment in a laboratory; make drawings of new designs; build models of new projects; program computers; or guide airplanes to their destinations. They are employed in nearly every industry, wherever technical assistance in a specialized area is needed.

Most technologists and technicians work closely with and are supervised by professional workers. For example, engineering technicians work with engineers, library technicians with librarians, and legal assistants with lawyers. They are usually part of a team that is engaged in a particular project or operation.

In most specialties, technologists and technicians use complex electronic or mechanical instruments, technical manuals, or other specialized materials. For example, air traffic controllers guide pilots by monitoring radar tracking devices. Legal assistants conduct research using specialized law books, while programmers work with computers.

Because of the diversity of technologist and technician occupations, training requirements vary widely. A high school diploma is a minimum requisite; most jobs, in fact, require specialized postsecondary training. Training is offered at junior and community colleges, technical institutes, vocational schools, and extension divisions of colleges and universities. These programs usually emphasize practical courses and "hands-on" experience in a particular specialty. Programs vary in length. For example, most legal assistant programs require 2 years' work. On the other hand, many programmers complete 4-year bachelor's degree programs.

In addition to acquiring a formal education, technologists and technicians often receive on-the-job training. For example, programmers generally work under close supervision for several months; air traffic controllers must complete several years of progressively more responsible work to become fully qualified. Occasionally, technologists and technicians take additional courses to keep abreast of technological advances in their specialty.

The knowledge and personal characteristics required in these jobs vary, but most technologists and technicians need a good foundation in mathematics and the basic sciences—physics, chemistry, and biology. They must be able to apply practical knowledge to solve particular problems. Because they are often part of a team, technologists and technicians must follow directions well and effectively communicate their findings to others. They must be patient, precise, and organized in their work habits. Also, most need manual dexterity to work with various kinds of equipment.

The following section describes the nature of the work, employment, training requirements, job outlook, earnings, and working conditions for a representative sample of technologist and technician occupations.

Air Traffic Controllers

(D.O.T. 193.162 except -022; .167-010)

Nature of the Work

Air traffic controllers are the guardians of the airways. They keep track of planes flying within their assigned area, and make certain that they are safe distances apart. Their immediate concern is safety, but controllers also must direct planes efficiently to minimize delays. Some regulate airport traffic; others regulate flights between airports.

Although airport tower controllers watch over all planes travelling through the airport's airspace, their main responsibility is to organize the flow of aircraft in and out of the airport. Relying both on radar and visual observation, they closely monitor each plane to maintain a safe distance between all aircraft and to guide pilots between the hangar or ramp and the end of the airport's airspace.

During arrival or departure, each plane is handled by several controllers. As a plane approaches an airport, the pilot radios ahead to inform the terminal of its presence. The "arrival controller" in the radar room just beneath the control tower has a copy of the plane's flight plan and already has observed the plane on radar. If the way is clear, the arrival controller directs the pilot to a runway; if the airport is busy, the plane is fitted into a traffic pattern with other aircraft waiting to land. As the plane nears the runway, the pilot is asked to contact the tower. There, a "local controller," who also is watching the plane on radar, monitors the aircraft the last mile or so to the runway, delaying any departures that would interfere with the plane's landing. Once the plane has landed, a "ground controller" in the tower directs it along the taxiways to its assigned gate. The ground controller works almost entirely by sight, but may use radar if visibility is very poor.

A similar procedure is used for departures. The ground controller directs the plane to the proper runway. The local controller then informs the pilot about conditions at the airport, such as the weather, speed and direction of wind, and visibility. The local controller also issues runway clearance for the pilot to take off. Once in the air, the plane is guided out of the airport's airspace by the "departure controller."

After each plane departs, airport tower controllers notify "enroute controllers" who will next take charge. There are 20 enroute control centers located around the country. Airplanes generally fly along designated routes; each center is assigned a certain airspace containing many different routes. Enroute controllers work in teams of up to three members, depending on how heavy traffic is; each team is responsible for a section of the center's airspace. A team, for example, might be responsible for all planes that are between 30 to 100 miles north of an airport and flying at an altitude between 6,000 and 18,000 feet.

To prepare for planes about to enter the team's airspace, the "radar associate controller" organizes flight plans coming from printing machines. If two planes are scheduled to enter the team's airspace at a similar time, location, and altitude, this controller may arrange with the preceding control unit for one plane to change its flight plans. The previous unit may have been another team at the same or an adjacent center, or a departure controller at a neighboring terminal. As a plane approaches a team's airspace, the "radar controller" accepts responsibility for the plane from the previous controlling unit. The controller also delegates responsibility for the plane to the next controlling unit when the plane leaves the team's airspace.

The "radar controller," who is the senior team member, observes the planes in the team's airspace on radar and communicates with the pilots when necessary. Radar controllers warn pilots about nearby planes, bad weather conditions, and other possible hazards. Two planes on a collision course will be directed around each other. If a pilot wants to change altitude in search of better flying conditions, the controller will check to determine that no other planes will be along the proposed path. As the flight progresses, the team responsible for the aircraft notifies the next team in charge. Through team coordination, the plane arrives safely at its destination.

Both airport tower and enroute controllers usually control several planes at one time and often have to make quick decisions about completely different activities. For example, a controller might direct a plane on its landing approach and at the same time provide pilots entering the airport's airspace with information about conditions at the airport. While instructing these pilots, the controller also would observe other planes in the vicinity, such as those

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in a holding pattern waiting for permission to land, to ensure that they remain well separated.

In addition to airport towers and enroute centers, air traffic controllers also work in flight service stations operated at over 300 locations. These controllers provide pilots with information on the station's particular area, including terrain, preflight and inflight weather information, suggested routes, and other information important to the safety of a flight.

Working Conditions

Controllers work a basic 40-hour week; however, they may work additional hours for which they receive overtime pay or equal time off. Because most control towers and centers operate 24 hours a day, 7 days a week, controllers rotate night and weekend shifts.

During busy times, controllers must work rapidly and efficiently. This requires total concentration by each controller. They must keep track of several planes at the same time and make certain all pilots receive correct instructions.

Employment

Air traffic controllers held about 21,000 jobs in 1982, at airports—in towers and flight service stations—and in enroute traffic control centers. The overwhelming majority worked for the Federal Aviation Administration (FAA); a small number of civilian controllers worked for the Department of Defense.

Training, Other Qualifications, and Advancement

Air traffic controller trainees are selected through the competitive Federal Civil Service System. Applicants must attain a high score on a written test that measures their ability to learn the controller's duties. Arithmetic computation, abstract reasoning, and three-dimensional spatial visualization are among the aptitudes measured by the examination. In addition, applicants generally must have 3 years of general work experience or 4 years of college, or a combination of both. Applicants must pass physical and psychological examinations and have vision correctable to 20/20. For airport tower and enroute center positions, applicants must be less than 31 years old. Those 31 years old and over are eligible for positions at flight service stations.

Potential controllers should be articulate, since directions to pilots must be given quickly and clearly. A good memory also is important because controllers constantly receive information which they must immediately grasp, interpret, and remember. Decisiveness is an asset, since controllers often have to make quick decisions.

Successful applicants receive a combination of on-the-job and formal training to learn the fundamentals of the airway system, FAA regulations, controller equipment, and aircraft performance characteristics. They receive 12 to 16 weeks of intensive training, including practice on simulators, at the FAA Academy in Oklahoma City. It then takes several years of progressively more responsible work experience, interspersed with considerable classroom instruction and independent study, to become a fully qualified controller.

At airports, new controllers begin in the tower, where they first serve as ground controller, then local controller, departure controller, and finally, arrival controller. At an enroute traffic control center, new controllers first deliver printed flight plans to teams, gradually advancing to radar associate controller and then radar controller. Failure to become certified in any position at a facility within a specified time may result in dismissal. Controllers who fail to complete either the academy or the on-the-job portion of the training are dismissed. Controllers must pass a physical examination each year and a job performance examination twice each year.

Controllers can transfer to jobs at different locations or advance to supervisory positions, including management or staff jobs in air traffic control and top administrative jobs in the FAA.

Air traffic controllers closely monitor each plane.

Job Outlook

Competition for air traffic controller jobs is expected to be keen through the mid-1990's because the occupation's relatively high pay and liberal retirement program attract many more qualified applicants than the number of job openings. College graduates or individuals who have civilian or military experience as controllers, pilots, or navigators will have the best employment opportunities.

Employment of air traffic controllers is expected to show little or no change through the mid-1990's. Despite the increase in the number of aircraft flying, few, if any, additional air traffic controllers will be needed because of the greater use of new, automated control equipment. Virtually all job openings will arise from the need to replace experienced controllers who transfer to other occupations, retire, die, or stop working for other reasons.

Air traffic controllers who continue to meet the proficiency and medical requirements enjoy more job security than most workers. The demand for air travel and the workloads of air traffic controllers decline during recessions, but controllers seldom are laid off.

Earnings

Air traffic controllers who started with the FAA in 1982 averaged about $16,100 (grade 7) a year. Controllers at the grade 9 level and above earn 5 percent more than other Federal workers in an equivalent grade. In 1982, controllers averaged $34,200 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, and health benefits. In addition, controllers can retire at an earlier age and with fewer years of service than other Federal employees.

Related Occupations

Other occupations which involve the direction and control of traffic in air transportation are airline-radio operator and airplane dispatcher.

Sources of Additional Information

For further information, request *Government Careers*, publication GA-300-128 (enclose a self-addressed mailing label), from:

U.S. Government Printing Office, Library and Statutory Distribution Service, 5208 Eisenhower Ave., Alexandria, Va. 22304.

A pamphlet providing general information about controllers and instructions for submitting an application is available from any U.S. Office of Personnel Management Job Information Center. Look under U.S. Government, Office of Personnel Management, in your telephone book to obtain a local Job Information

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Center telephone number and call for a copy of the Air Traffic Controller Announcement. If there is no listing in your telephone book, dial the toll-free number 800-555-1212 and request the number of the Office of Personnel Management Job Information Center for your location.

Broadcast Technicians

(D.O.T. 193.262-018, and -038; 194.262-010, .282-010, .362-010 and -018)

Nature of the Work

Broadcast technicians operate and maintain the electronic equipment used to record and transmit radio and television programs. They work with microphones, sound and video tape recorders, light and sound effects, television cameras, transmitters, and other equipment.

In the control room of the radio or television broadcasting studio, these technicians operate equipment that regulates the signal strength, clarity, and range of sounds and colors in the material being recorded or broadcast. They also operate control panels that select the source of the material being broadcast. Technicians may switch 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 studio are to be broadcast, technicians go to the site and set up, test, and operate the remote equipment. After the broadcast, they dismantle the equipment and return it to the station.

As a rule, broadcast technicians in small stations perform a variety of duties. In large stations and at networks, on the other hand, technicians are more specialized, although specific job assignments may change from day to day. *Transmitter operators* monitor and log outgoing signals and are responsible for operating the transmitter. *Maintenance technicians* set up, adjust, service, and repair electronic broadcasting equipment. *Audio control engineers* regulate sound pickup, transmission, and switching, and *video control engineers* regulate the quality, brightness, and contrast of television pictures. *Recording engineers* operate and maintain video and soundrecording equipment. Some technicians operate equipment designed to produce special effects, such as the illusions of a bolt of lightning or the sound of a police siren. When programs originate outside the studio, *field technicians* set up and operate broadcasting equipment. The terms "operator," "engineer," and "technician" often are used interchangeably in describing these jobs.

Supervisory personnel with job titles such as *chief engineer* or *transmission engineer* direct activities concerned with the operation and maintenance of studio broadcasting equipment.

Working Conditions

Broadcast technicians generally work indoors in pleasant surroundings. Stations are air-conditioned because transmitters and other electronic equipment must be operated at cool temperatures. Broadcasts outside the studio, however, may require technicians to work out of doors under less favorable conditions.

Network technicians may occasionally have to work long hours under great pressure to meet broadcast deadlines.

Employment

Broadcast technicians held about 17,000 jobs in radio and television stations in 1982. Television stations employ, on the average, many more technicians than radio stations. Although broadcast technicians are employed in every State, most are located in large metropolitan areas. The highest paying and most specialized jobs are concentrated in New York City, Los Angeles, and Washington, D.C.—the originating centers for most of the network programs.

Training, Other Qualifications, and Advancement

Federal law requires that anyone who operates broadcast transmitters in radio and television stations must have a restricted radiotelephone operator permit for which no examination is required. Persons who work with microwave or other internal radio communications equipment, however, must have a general radiotelephone operator license, issued after the applicant passes a series of written examinations. These cover communications law and regulations, radio operating practices, and basic communications electronics.

Technical school, community college, or college training in engineering or electronics is the best way to prepare for a broadcast technician job, particularly for those who hope to advance to supervisory positions or to the more specialized jobs in large stations and in the networks. High school courses in algebra, trigonometry, physics, electronics, and other sciences also provide valuable background for a career in this occupation. Building electronic hobby kits and operating a "ham" or amateur radio also are good introductions to broadcasting technology. Some persons gain work experience as temporary employees while filling in for regular broadcast technicians who are on vacation.

Broadcast technicians must have an aptitude for working with electrical and mechanical systems and equipment. Manual dexterity—the ability to perform tasks requiring precise, coordinated hand movements—is necessary for success in this occupation.

Entry level workers are instructed and supervised by the chief engineer, or by other experienced technicians, concerning the work procedures of the station. They generally begin their careers in small stations, 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 or chief engineer. A college degree in engineering is becoming increasingly important for advancement to supervisory and executive positions.

Job Outlook

People seeking beginning jobs as broadcast technicians are expected to face strong competition in major metropolitan areas where the number of qualified jobseekers greatly exceeds the number of openings. As is the case with

During a television broadcast, the technician controls what a viewer sees.

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other occupations in radio and television broadcasting, stations in major metropolitan areas seek highly experienced personnel to fill broadcast technician jobs. Prospects for entry level positions generally are good in small cities for people with appropriate training in electronics.

Employment of broadcast technicians is expected to increase about as fast as the average for all occupations through the mid-1990's. New job opportunities for technicians will arise as new commercial radio and television stations go on the air, established stations increase their broadcasting hours, and cable television systems originate more of their own programs. However, demand for broadcast technicians may not keep pace with the increase in broadcasting because of laborsaving technical advances such as computer-controlled programming and remote control of transmitters. Technological developments such as these have shifted the emphasis from operations to maintenance work, which frequently is performed by service personnel employed by broadcasting equipment manufacturers. Most job openings will result from the need to replace experienced technicians who retire, die, or transfer to other occupations.

Earnings

In 1982, average earnings for technicians at radio stations were $280 a week. In television, earnings were somewhat higher, about $320 a week. As a rule, technician wages are highest in large cities and large stations. Technicians in the largest stations earned, on the average, about twice as much as those in the smallest stations. Earnings of experienced technicians were much higher, and technicians who can perform the full range of tasks are, of course, the highest paid. Television stations usually pay higher salaries than 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 additional hours. Broadcast technicians in small stations generally work a considerable amount of overtime. Evening, night, and weekend work frequently is necessary since most stations are on the air 18-24 hours a day, 7 days a week.

Related Occupations

Broadcast technicians need the electronics training and hand coordination necessary to operate technical equipment; they generally complete specialized postsecondary programs, including courses in electronics and engineering. Others whose jobs have similar requirements include drafters, engineering and science technicians, surveyors, air traffic controllers, radiologic technologists, respiratory therapy workers, electrocardiograph technicians, electroencephalographic technicians, and medical laboratory technicians.

Sources of Additional Information

For information about the general radiotelephone operator license, write to:

Federal Communications Commission, 1919 M St. NW., Washington, D.C. 20554.

For information on careers for broadcast technicians, write to:

National Association of Broadcasters, 1771 N St. NW., Washington, D.C. 20036.

For a list of schools that offer programs or courses in broadcasting, contact:

Broadcast Education Association, National Association of Broadcasters, 1771 N St. NW., Washington, D.C. 20036.

Computer Programmers

(D.O.T. 020.162-014, .167-018, -022, .187-010, -014, and .262-010)

Nature of the Work

Computers can process vast quantities of information rapidly and accurately, but only if they are given step-by-step instructions to follow. Because the machines cannot think for themselves, computer programmers must write detailed instructions called programs that list in a logical order the steps the machine must follow to organize data, solve a problem, or do some other task.

Programmers usually work from descriptions prepared by systems analysts who have carefully studied the task that the computer system is going to perform—perhaps organizing data collected in a survey or estimating the stress on portions of a building during a hurricane. These descriptions contain a detailed list of the steps the computer must follow, such as retrieving data stored on a tape or disk, organizing it in a certain way, and performing the necessary calculations. (A more detailed description of the work of systems analysts is contained elsewhere in the *Handbook*.) An applications programmer then writes the specific program for the problem, by breaking down each step into a series of coded instructions (software) using one of the languages, such as assembler, BASIC, COBOL, and FORTRAN, developed especially for computers.

Some organizations, particularly smaller ones, do not employ systems analysts. Instead, workers called programmer-analysts are responsible for both systems analysis and programming.

Programs vary with the type of problem to be solved. For example, the arithmetical calculations involved in payroll accounting procedures are different from the mathematical calculations required to determine the flight path of a space probe. Business applications programmers developing instructions for billing customers would first take the appropriate company records and then specify a solution by showing the steps the computer must follow to obtain old balances, add new charges, deduct payments, and calculate finance charges and the new amount due. Programmers then code the actual instructions the computer will follow in a high-level programming language, such as COBOL, which is commonly used for business applications. They also insert comments in the coded instructions so other programmers can understand the program.

Next, programmers test the operation of the program to be sure the instructions are correct and will produce the desired information. Programmers prepare sample data that will test every part of the program and review the results to see if any errors were made. If errors did occur, the program must be changed and rechecked until it produces the correct results. This is called "debugging" the program.

Finally, programmers prepare an instruction sheet for the computer operator who will run the program. (The work of computer operators is described in the statement on computer operating personnel.)

Although simple programs can be written in a few hours, programs that use complex mathematical formulas or many data files may require more than a year of work. In some cases, several programmers may work together in teams under a senior programmer's supervision.

Applications programmers are usually business oriented, engineering oriented, or science oriented. A different type of specialist, the systems programmer, maintains the general instructions that control the operation of the entire computer system. These workers make changes in the sets of instructions that determine how the central processing unit of the computer handles the various jobs it has been given and communicates with peripheral equipment, such as terminals, printers, and disk drives. Because of their knowledge of entire computer system, systems programmers often help applications programmers determine the source of problems that may occur with their programs.

Working Conditions

Programmers work about 40 hours a week, but their hours are not always from 9 to 5. Programmers may report early or work late to use the computer when it is available; occasionally, they work on weekends. When a new program is being tested, programmers may get calls from computer operators asking for advice at all hours of the day or night.

Employment

Computer programmers held about 266,000 jobs in 1982. Most were employed by manufacturing firms, data processing service organizations—including firms that write and sell software—government agencies, banks, insurance companies and colleges and universities.

Many applications programmers work for large firms that need and can afford expensive computer systems and for small firms that maintain their own low-cost minicomputers. Systems programmers usually work for organizations with large computer centers and for firms that manufacture computers or develop software.

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Training, Other Qualifications, and Advancement

There are no universal training requirements for progammers because employers' needs vary. Computer programming is taught at public and private vocational schools, community and junior colleges, and universities. High schools in many parts of the country also offer introductory courses in data processing. Many programmers are college graduates; others have taken special courses in computer programming to supplement their experience in fields such as accounting, inventory control, or other business areas.

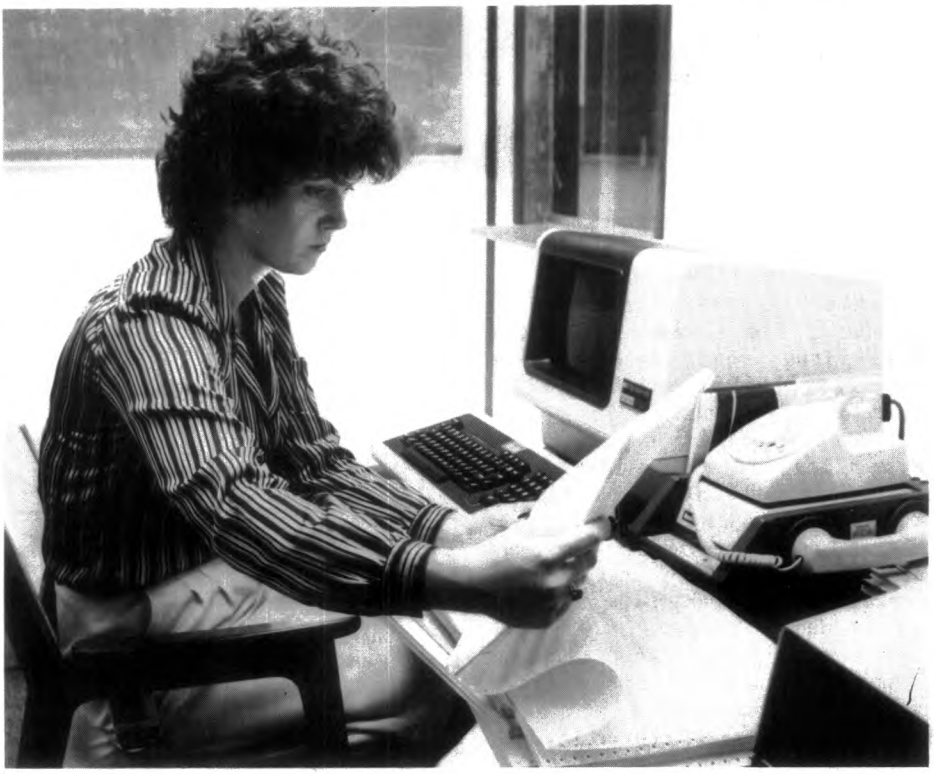
Employers using computers for scientific or engineering applications prefer college graduates who have degrees in computer or information science, mathematics, engineering, or the physical sciences. Graduate degrees are required for some jobs. Very few scientific organizations are interested in applicants who have no college training.

Employers who use computers for business applications prefer to hire people who have had college courses in programming and business; however, a bachelor's degree is not required by all employers. Also, experience in accounting, inventory control, and other business skills generally is preferred by employers. Some employers promote workers such as computer operators who have taken courses in programming to programmer jobs because of their work experience.

An indication of experience and professional competence at the senior programmer level is the Certificate in Computer Programming (CCP). This designation is conferred by the Institute for Certification of Computer Professionals upon candidates who have passed a basic five-part examination. In addition, individuals may take another section of the exam in order to specialize in business, science, or systems applications.

In hiring programmers, employers look for people who can think logically and are capable of exacting analytical work. The ability to work with abstract concepts and do technical analysis is especially important for systems programmers because they work with the software that controls the computer's operation. The job calls for patience, persistence, and the ability to work with extreme accuracy even under pressure. Ingenuity and imagination are particularly important when programmers must find new ways to solve a problem.

Beginning programmers usually spend their first weeks on the job attending training classes. After this initial instruction, they work on simple assignments, such as maintaining existing programs, while completing further specialized training. Programmers generally must spend at least several months working under close supervision before they can handle all aspects of their job. Because of rapidly changing technology, programmers must continue their training by taking courses offered by their employer and software vendors. For skilled workers, the prospects for advancement are good. In large organizations, they may be promoted to lead programmers and be given supervisory responsibilities. Some applications programmers become systems programmers after they gain experience and take courses in system software. Both applications programmers and systems programmers may become systems analysts or be promoted to managerial positions.



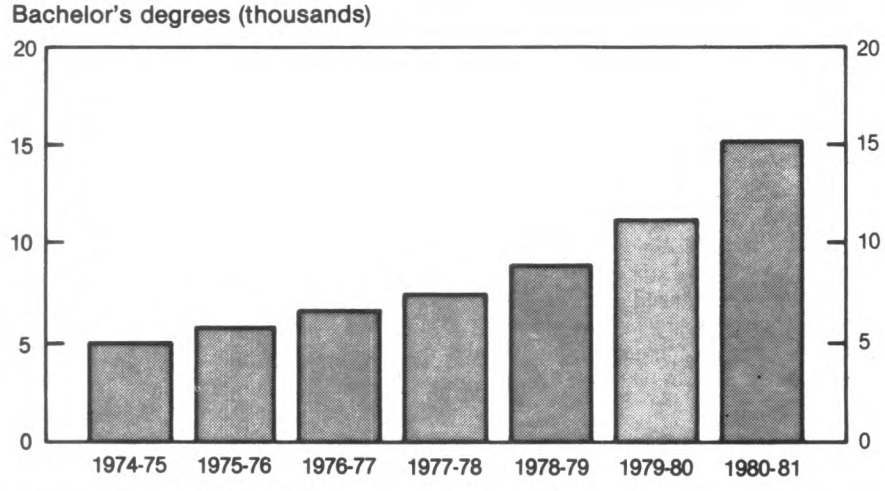
Updating programs is an important aspect of the programmer's work.

Job Outlook

Employment of programmers is expected to grow much faster than the average for all occupations through the mid-1990's as computer usage expands. The demand for applications programmers will increase as many more processes are computerized, but employment is not expected to grow as rapidly as in the past. Improved software that can be used by nonprogrammers will simplify or eliminate some programming tasks. More systems programmers will be needed to develop and maintain the complex operating programs that allow the use of higher level computer languages, and the networking of computer equipment and systems.

In addition to jobs resulting from increased demand for programmers, many openings will

The number of college graduates in computer and information science has risen sharply.



SOURCE: National Center for Education Statistics

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arise each year from the need to replace workers who leave the occupation. Although the proportion of programmers leaving the occupation each year is smaller than in most occupations, most of the job openings for programmers will result from replacement needs. Most of the programmers who leave the occupation transfer to other occupations, such as manager or systems analyst.

Job prospects should be best for college graduates who have had computer-related courses, particularly for those with a major in computer science or computer information systems and experience or training in an applied field such as accounting, management, engineering, or science. Graduates of 2-year programs in data processing and people with less than a 2-year degree or its equivalent in work experience may face competition. In the past, due to the rapid growth in demand for programmers, employers hired people with almost any type of training in programming. The rapid growth of employment opportunities, however, has led to substantial increases in the number of courses in programming being offered by postsecondary schools, junior colleges, and 4-year colleges and, consequently, in the number of people seeking jobs in this field. As the number and quality of applicants have increased, employers have become more selective. Because shorter curriculums may offer limited training in applied fields and some aspects of programming, graduates of those curriculums are expected to have more difficulty finding jobs than in the past.

Earnings

Median earnings of programmers who worked full time in 1982 were about $445 a week. The middle 50 percent earned between $345 and $570 a week. The lowest 10 percent earned less than $275 a week, the highest 10 percent more than $680.

Average earnings of beginning business programmers in private industry were about $334 a week in 1982, according to surveys conducted in urban areas by the Bureau of Labor Statistics. Systems programmers generally earn more than applications programmers, and lead programmers earn more than either systems or applications programmers. For example, experienced systems programmers earned about $460 a week compared to $360 for applications programmers. Weekly salaries for lead systems programmers were about $545, compared to $440 for lead applications programmers. In the Federal Government, the entrance salary for programmers with a college degree was about $300 a week in early 1982.

Programmers working in the North and West earned somewhat more than those working in the South. Those working in manufacturing and public utilities had higher earnings than programmers employed in other industries.

Related Occupations

Other workers in mathematics, business, and science who solve detailed problems include systems analysts, mathematicians, statisticians, engineers, financial analysts, actuaries, mathematical technicians, and operations research analysts.

Sources of Additional Information

Additional information about the occupation of programmer is available from:

American Federation of Information Processing Societies, 1815 North Lynn St., Arlington, Va. 22209.

Computer Careers-DOL, DPMA, 505 Busse Hwy. Chicago, Ill. 60068.

Information about the Certificate in Computer Programming is available from:

The Institute for Certification of Computer Professionals, 35 E. Wacker Dr., Suite 1752, Chicago, Ill. 60601.

Drafters

(D.O.T. 001.261-010 and -014; 002.261-010; 003.281-010, -014, and -018; 005.281-010 and -014; 007.161-018, .167-022, .261-010, -014, -018, -022, and .281-010; 010.281-010, -014, -018; 014.281-010; 017; 018.261-010, -014, and .281)

Nature of the Work

When building a satellite, television set, or bridge, workers follow drawings prepared by drafters that show the exact dimensions and specifications of the entire design and each of its parts.

Drafters prepare detailed drawings based on rough sketches, specifications, and calculations made by scientists, engineers, architects, and designers. Final drawings contain a detailed view of the object from all sides as well as specifications for materials to be used, procedures followed, and other information to carry out the job.

In preparing drawings, drafters use compasses, dividers, protractors, triangles, and other drafting devices. They also use technical handbooks, tables, and calculators to help solve problems.

Drafters are increasingly using computer-aided design systems which greatly increase their productivity. Instead of sitting at drafting boards, drafters who use computer-aided design systems sit at computer terminals and make the drawing on a TV-like screen. In some cases, the design may never be placed on paper. It may be stored electronically or, in some factories, may be used to guide automatic machinery.

Drafters are classified according to the work they do or their level of responsibility. *Senior drafters* 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 drawing clear and complete. *Checkers* carefully examine drawings for errors in computing or recording dimensions and specifications.

Drafters usually specialize in a particular field of work, such as mechanical, electrical, aeronautical, structural, or architectural drafting.

Working Conditions

Although drafters usually work in well-lighted and well-ventilated rooms, they often must sit and do very detailed work for long periods of time. This work may cause eye strain and back discomfort.

Employment

Drafters held about 302,000 jobs in 1982. About one-third of all drafters worked for engineering and architectural firms, and about one-third worked in durable goods manufacturing industries, such as fabricated metals, electrical equipment, and machinery. Drafters also were employed in the construction, transportation, communications, and utilities industries.

About 19,000 drafters worked in government in 1982, primarily at the State and local level. Most drafters in the Federal Government worked for the Department of Defense. Some drafters were employed in colleges and universities and nonprofit organizations.

Training, Other Qualifications, and Advancement

Employers prefer applicants for drafting positions who have acquired training in technical institutes, junior and community colleges, extension divisions of universities, and vocational and technical high schools. Some persons receive training and experience in the Armed Forces. Others qualify through on-the-job training programs combined with part-time schooling or through 3- to 4-year apprenticeship programs. Over 50 percent of those who obtained jobs as drafters in 1980 had some college education and over 10 percent were 4-year college graduates. In addition, many had other postsecondary training.

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. Courses in shop practices and shop skills also are helpful since most higher level drafting jobs require knowledge of manufacturing or construction methods. Many technical schools offer courses in structural design, architectural drawing, and engineering or industrial technology. Training in the use of computer-aided design equipment is becoming increasingly important. In the future, many drafters will seldom or never work at the traditional drawing board.

Those planning careers in drafting should be able to do freehand drawings of three-dimensional objects and also detailed work requiring a high degree of accuracy. They should have good eyesight and manual dexterity. In addition, they should be able to function as part of a team since they work directly with engineers, architects, designers, and other workers. Artistic ability is helpful in some specialized fields.

High school graduates usually start out doing routine work under close supervision. Those having post-high school technical training may begin as junior drafters. After gaining experience, they may advance to checkers, detailers, senior drafters, designers, or supervisors. Some may become independent designers.

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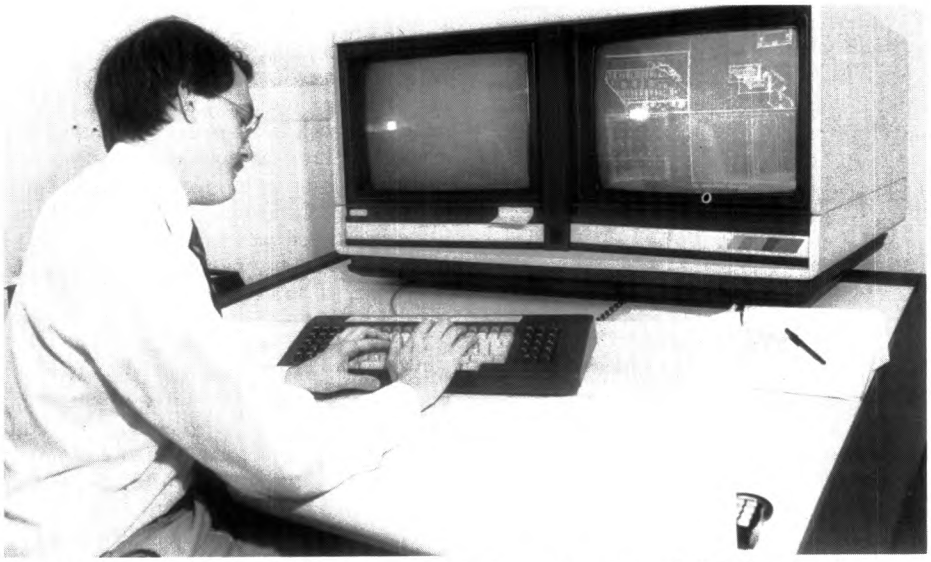

Drafters are increasingly using computer-aided design systems instead of drafting boards.

Job Outlook

Little change in employment of drafters is expected through the mid-1990's. Despite industrial growth and the increasingly complex design problems associated with new products and processes, widespread use of computer-aided design equipment—which greatly increases drafters' productivity—is expected to offset demand. Employers may eliminate many drafting positions because new equipment allows engineers and architects to produce some designs and drawings themselves without the need for drafters. However, most employers will probably continue to employ some drafters to add details to the general plans prepared by engineers and architects. Even though little or no growth in employment is expected, a large number of openings will result each year from the need to replace drafters who transfer to other occupations, retire, or die. The use of computer-aided design equipment may change the nature of the drafter's work. Since automatic equipment eliminates much of the less skilled work, drafters of the future may be designers rather than drafters—they will design details, make stuctural strength and other calculations, and prepare specifications. Therefore, drafters may need a higher level of training and experience in engineering and design-related areas.

Drafters are highly concentrated in industries that are sensitive to cyclical swings in the economy, such as engineering and architectural services and durable goods manufacturing. During an economic recession, drafters may be laid off as fewer products are designed, less research and development work is done, and fewer drafting services are needed.

Earnings

Median annual earnings of drafters were about $19,000 in 1982; the middle 50 percent earned between $15,000 and $24,000 annually. Ten percent earned less than $12,000 and 10 percent more than $31,000.

In private industry, beginning drafters averaged about $11,700 a year in 1982, while more experienced drafters averaged between $14,200 and $21,000 a year. Senior drafters averaged about $25,900 a year in 1982.

The Federal Government paid drafters who had an associate degree starting salaries of $11,949 a year in early 1983. Those with less education or experience generally started at $10,645. The average Federal Government salary for all drafters was about $15,600 a year in 1982.

Related Occupations

Other occupations in which workers are required to prepare or understand detailed drawings, make accurate and precise calculations and measurements, and use various measuring devices include architects, engineering technicians, engineers, landscape architects, photogrammetrists, and surveyors.

Sources of Additional Information

General information on careers for drafters is available from:

American Institute for Design and Drafting, 102 North Elm Place, Suite F, Broken Arrow, Okla. 74012.

Other sources of information are listed at the end of the following statement on electrical and electronics technicians.

Electrical and Electronics Technicians

(D.O.T. 003.161; .261; 019.281; and 828.251)

Nature of the Work

Knowledge of science, mathematics, and electrical and electronic equipment enables electrical and electronics technicians to work in all phases of business and government—from research and design to manufacturing, sales, and customer service. Although their jobs are more limited in scope and more practically oriented than those of engineers or scientists, electrical and electronics technicians often apply the theoretical knowledge developed by engineers and scientists to actual situations. Electrical and electronics technicians develop, manufacture, and service electronic and electrical equipment and systems such as radios, radar, sonar, televisions, industrial and medical measuring or control devices, navigational equipment, and computers. Because the field is so broad, electrical and electronics technicians often specialize in one area, such as automatic control devices or electronic amplifiers.

When working in design, production, or customer service, electrical and electronics technicians use sophisticated measuring and diagnostic devices to test, adjust, and repair equipment. In many cases, they must understand the purpose for which the electronic device is being used. To design equipment for space exploration, for example, a technician must consider the need for minimum weight and volume and maximum resistance to shock, extreme temperature, and pressure. Some electrical and electronics technicians also work in the radio and television broadcasting industry. (See the statement on broadcast technicians elsewhere in the *Handbook*.)

In research and development, one of the largest areas of employment, electrical and electronics technicians set up experiments and equipment and calculate the results, sometimes with the aid of computers. They also assist engineers and scientists by making prototype versions of newly developed equipment and, frequently, by doing routine design work.

In production, electrical and electronics technicians usually follow the general directions of engineers and scientists, but often without close supervision. They may prepare specifications for components and devise and conduct tests to insure product quality. They often supervise production workers to make sure they follow prescribed procedures.

As sales workers or field representatives for manufacturers, electrical and electronics technicians give advice on the installation and maintenance of complex equipment and may write specifications and technical manuals.

Working Conditions

Electrical and electronics technicians work under a wide variety of conditions. Most work regular hours in laboratories, electronic shops, or industrial plants. Sales workers or service representatives usually spend much of their time visiting customers. Some occasionally are exposed to electric shock hazards from equipment.

Employment

Electrical and electronics technicians held about 366,000 jobs in 1982. Over 90 percent of all electrical and electronics technicians worked in private industry. In the manufacturing sector, the largest employers were the electrical equipment, machinery, and professional

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An electronics technician services an air traffic control radar.

and scientific equipment industries. Almost one-fourth worked in wholesale trade, mainly for distributors of machinery, equipment, and electrical goods. Large numbers also worked for public utilities and service and repair companies.

In 1982, the Federal Government employed about 23,000 electrical and electronics technicians, mainly in the departments of Defense and Transportation. State government agencies employed almost 2,000 and local governments about 3,000.

Training, Other Qualifications, and Advancement

Although persons can qualify for electrical or electronics technician jobs through many combinations of work experience and education, most employers prefer applicants who have had some specialized technical training. Specialized training is available at technical institutes, junior and community colleges, extension divisions of colleges and universities, and public and private vocational-technical schools. A few engineering and science students who have not completed the bachelor's degree and others who have degrees in science and mathematics also may be able to qualify for some positions with additional training or experience.

Persons also can qualify for technician jobs through on-the-job training, apprenticeship programs, or correspondence schools. Some qualify on the basis of experience gained in the Armed Forces.

Some of the types of schools that provide electrical and electronic training are discussed in the following paragraphs.

Technical Institutes. Technical institutes offer training to qualify students for a job immediately after graduation with a minimum of on-the-job training. In general, students receive intensive technical training but less theory and general education than they would in engineering schools or liberal arts colleges. A few technical institutes and community colleges offer cooperative programs in which students spend part of the time in school and part in paid employment related to their studies. Such practical work experience can be a decided advantage when seeking full-time employment as an electrical or electronics technician.

Some technical institutes operate as regular or extension divisions of colleges and universities. Other institutions are operated by States and municipalities, or by private organizations.

Junior and Community Colleges. Curriculums in junior and community colleges which prepare students for technician occupations are similar to those in technical institutes but also emphasize theory and liberal arts. After completing the 2-year programs, some graduates qualify for jobs as an electrical or electronics technician while others continue their education at 4-year colleges.

Area Vocational-Technical Schools. These postsecondary public institutions serve students from surrounding areas and emphasize training in skills needed by employers in the local area. Most require a high school degree or its equivalent for admission.

Other Training. Some large corporations conduct training programs and operate private schools to meet their needs for electrical and electronics technicians trained in specific areas; such training rarely includes general studies. Training is also 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 acquires related technical knowledge in classes, usually conducted after working hours.

The Armed Forces train many types of electrical and electronics technicians. Although military job requirements generally differ from those in the civilian economy, military technicians often find private or civilian government jobs with only minimal additional training.

Many private technical and correspondence schools specialize in electronics. Some of these schools are owned and operated by large corporations that have the resources to provide up-to-date training in a technical field.

Persons interested in a career as an electrical or electronics 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. Electrical and electronics technicians are part of a scientific team, and often work closely with engineers and scientists as well as other technicians and skilled workers. Some electrical and electronics technicans, such as those who do repair and maintenance, should be able to work independently and to deal effectively with customers.

Electrical and electronics 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. Some eventually become supervisors.

Job Outlook

Employment of electrical and electronics technicians is expected to increase much faster than the average for all occupations through the mid-1990's due to increased demand for computers, communications equipment, military electronics, and electronic consumer goods. More technicians will be needed to help develop, produce, and service these products. Opportunities will be best for graduates of postsecondary school technical training programs, particularly programs in which students gain practical work experience.

Although a relatively small proportion of electrical and electronics technicians leave the occupation, most job openings will be to replace technicians who transfer to other occupations, retire, or leave the occupation for other reasons.

Since many jobs for electrical and electronics technicians are defense related, cutbacks in defense spending—like those which took place in 1969 and 1970—could result in layoffs in defense-related industries.

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Earnings

Median annual earnings of full-time electrical and electronics technicians were about $21,000 in 1982; the middle 50 percent earned between $16,500 and $26,000. Ten percent earned below $13,000 and 10 percent earned over $31,000.

Electrical and electronics technicians entering the Federal Government in early 1983 with a high school degree and no experience could expect $10,645 annually to start. With an associate degree, the starting salary was $11,949, and with a bachelor's degree, $13,369.

Related Occupations

Electrical and electronics technicians apply scientific principles in their work. Other technicians whose work activities involve the application of scientific principles include mechanical and industrial engineering technicians, forestry technicians, broadcast technicians, drafters, surveying technicians, television and radio service technicians, computer service technicians, dental laboratory technicians, and medical technologists and technicians.

Sources of Additional Information

For information on a career as an electrical and electronics technician, contact:

Jets Inc., 345 East 47th St., New York, N.Y. 10017.

International Society of Certified Electronics Technicians, 2708 W. Berry, Suite 3, Ft. Worth, Tex. 76109.

Information on schools offering programs in electrical and electronics technology and other areas is available from:

National Association of Trade and Technical Schools, 2021 K St. NW., Washington, D.C. 20006.

Legal Assistants

(D.O.T. 119.267-022 and -026)

Nature of the Work

Not all legal work requires a lawyer's expertise. In recent years, lawyers have increasingly used legal assistants—also called "paralegals" or "legal technicians"—to help provide legal services to more persons at less cost.

Legal assistants work directly under the supervision of a lawyer. While the lawyer assumes responsibility for the legal assistant's work, a legal assistant is allowed to perform all the functions of a lawyer other than accepting clients, setting legal fees, giving legal advice, or presenting a case in court.

Legal assistants generally do background work for the lawyer. To help a lawyer prepare a case for trial, a legal assistant investigates the facts of the case to make sure that all relevant information is uncovered. The legal assistant conducts research to identify the appropriate laws, judicial decisions, legal articles, and other material that will be used to determine whether the client has a good case or not. After analyzing all the information, the legal assistant prepares a written report that is used by the attorney to decide how the case should be handled. If the attorney decides to bring a lawsuit for the client, the legal assistant may prepare legal arguments, draft pleadings to be filed with the court, obtain affidavits, and assist the attorney during the trial. The legal assistant also may keep files of all documents and correspondence important to the case.

Besides trial-related work, legal assistants may help draft documents such as contracts, mortgages, separation agreements, and trust instruments for an attorney's clients. They may help prepare tax returns and plan estates. Some legal assistants coordinate the activities of law office employees and keep financial records for the law office.

Legal assistants who work for corporations help attorneys handle corporate matters such as employee contracts, shareholder agreements, stock option plans, and employee benefit plans. They may help prepare and file annual financial reports and secure loans for the corporation. Legal assistants also review government regulations to make sure that the corporation operates within the law.

The duties of legal assistants who work in government vary depending on the type of agency that employs them. Generally, legal assistants in government analyze legal material for internal use, maintain reference files, conduct research for attorneys, collect and analyze evidence for agency hearings, and prepare informative or explanatory material on the law, agency regulations, and agency policy for general use by the agency and the public.

Legal assistants employed in community legal service projects help the poor, the aged, and other persons in need of legal aid. They file forms, conduct research, and prepare documents. When authorized by statute, they may represent clients at administrative hearings.

Some legal assistants, usually those in small and medium-sized law firms, have varied duties. One day the legal assistant may do research on judicial decisions on improper police arrests and the next day may help prepare a mortgage contract. This requires a general knowledge of many areas of the law.

Most legal assistants—those who work for large, departmentalized law firms, government agencies, and corporations—specialize in one area of the law. Some specialties are real estate, estate planning, family law, labor law, litigation, and corporate law. Even within specialties, functions often are broken down further so that a legal assistant deals with one narrow area of the specialty. For example, legal assistants who specialize in labor law may deal exclusively with employee benefits.

Working Conditions

Legal assistants do most of their work at desks in offices and law libraries. Occasionally, they travel to gather information and perform other duties. They may work alone or with others.

Most legal assistants work a standard 40-hour week. Sometimes, they work very long hours and are under pressure to meet deadlines. Usually they do not get paid for overtime work, although they may receive compensatory time off.

Legal assistants handle many routine assignments. Some find that these assignments offer little challenge and become frustrated with their duties. On the other hand, many lawyers assign more responsible tasks as the legal assistant gains experience. Furthermore, as new laws and judicial interpretations emerge, legal assistants are exposed to many new legal problems that make their work more interesting and challenging.

Employment

Legal assistants held more than 45,000 jobs in 1982; private law firms employed the majority. Legal assistants are found in nearly every Federal Government agency; the Departments of Justice, Treasury, Interior, and Health and Human Services and the General Services Administration are the largest employers. State and local governments and publicly funded legal services projects also employ legal assistants. Banks, real estate development companies, insurance companies, accounting firms, management consulting firms, manufacturing firms, and other corporate offices hire legal assistants.

Training, Other Qualifications, and Advancement

There are several ways to enter the legal assistant profession. Increasingly, employers require formal legal assistant training. Some employers train other experienced legal personnel, such as legal secretaries, for legal assistant positions. A few employers require only a high school diploma and train their legal assistants on the job.

Several hundred formal programs in legal assistance are available from 4-year colleges and universities, law schools, community and junior colleges, business schools, proprietary schools, legal assistant associations, and a few law firms. In 1982, about 70 programs had been approved by the American Bar Association; approval by the ABA is not required and not all

To help lawyers prepare a case for trial, legal assistants do research on relevant laws and judicial decisions.

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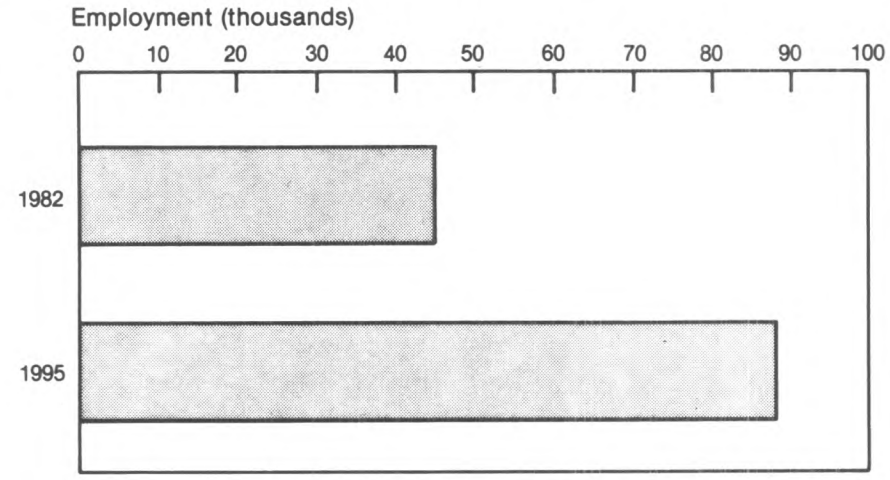
Employment of legal assistants is expected to nearly double between 1982 and 1995.



SOURCE: Bureau of Labor Statistics

programs seek it. The requirements for admission to formal training programs vary widely. Some require some college courses or a bachelor's degree. Others accept high school graduates or persons with legal experience. A few schools require standardized tests and personal interviews.

Most legal assistant programs are completed in 2 years, although some take as long as 4 years. A few programs of very intensive instruction last only a few months. Some schools offer general legal assistant training with courses in many different areas of the law, including legal research techniques. Others provide training in specialized areas of the law, such as real estate, estate planning and probate, litigation, family law, contracts, criminal law, and income taxation. Many employers prefer applicants with training in a specialized area of the law. Many legal assistant training programs include an internship in which students gain practical experience by working in a law office, corporate legal department, or government agency. Depending on the program, graduates may receive a certificate, an associate degree, or, in some cases, a bachelor's degree in legal assistance.

The quality of legal assistant training programs varies widely; the better programs generally emphasize job placement. Prospective students should examine the experiences of recent graduates of programs in which they are considering enrolling.

Currently, legal assistants need not be certified. The National Association of Legal Assistants, however, has established standards for voluntary certification. Legal assistants who meet these standards, which require various combinations of education and experience, are eligible to take a 2-day examination given by the Certifying Board of Legal Assistants. This examination is administered each year at several regional testing centers. Persons who pass this examination may use the designation Certified Legal Assistant (CLA). This designation is a sign of competence in this field and enhances one's employment and advancement opportunities.

Legal assistants must be able to handle legal problems logically and effectively communicate (both orally and in writing) their findings and opinions to their supervising attorney. They must understand legal terminology and have good research and investigative skills. Familiarity with the operation and applications of computers in legal research is increasingly important. Legal assistants must always stay abreast of new developments in the law that affect their duties.

Because legal assistants often deal with the public and other employees, they must be courteous and uphold the high ethical standards of the legal profession. A few States have established ethical guidelines that legal assistants in the State must follow.

Experienced legal assistants usually are given progressively more responsible duties and are less closely supervised. In large law firms, corporate legal departments, and government agencies, experienced legal assistants may supervise other legal assistants and delegate work assigned by the attorneys. While advancement opportunities usually are limited, a few legal assistants are promoted to managerial positions.

Job Outlook

The number of job openings for legal assistants is expected to increase significantly through the mid-1990's, but so will the number of persons pursuing this career. Thus, competition for jobs should increase as the number of graduates from legal assistant training programs rises. Still, job prospects are expected to be good for graduates of highly regarded formal programs.

Employment of legal assistants has grown tremendously since the emergence of this occupation in the late 1960's. Although the rate of growth should slow somewhat through the mid-1990's, employment still is expected to grow much faster than the average for all occupations. The emphasis on hiring legal assistants should continue in both legal and law-related fields so that the cost, availability, and efficiency of legal services can be improved. Besides employment growth, numerous job openings are expected to arise as persons leave the occupation for various reasons.

Private law firms will continue to be the largest employers of legal assistants as a growing population sustains the need for legal services. The growth of prepaid legal plans also should contribute to the demand for the services of law firms. Other organizations, such as corporate legal departments, insurance companies, real estate and title insurance firms, and banks will continue to hire legal assistants. Job opportunities are expected to expand throughout the private sector as companies become aware of the value of legal assistants.

Job opportunities for legal assistants will expand even in the public sector. Community legal services programs provide assistance to the poor, the aged, minorities, and middle-income families. Because these programs operate on limited budgets, legal assistants will be used to keep expenses down without having to limit services. Federal, State, and local government agencies, consumer organizations, and the courts also should continue to hire legal assistants in increasing numbers.

To a limited extent, legal assistant jobs are affected by the business cycle. During recessions, the demand for some discretionary legal services, such as planning estates, drafting wills, and handling real estate transactions, declines. Corporations are less inclined to initiate litigation when falling sales and profits lead to fiscal belt tightening. As a result, legal assistants employed in offices adversely affected by a recession may be laid off. On the other hand, during recessions, corporations and individuals face other legal problems, such as bankruptcies, foreclosures, and divorces, that require legal solutions. Furthermore, the continuous emergence of new laws and judicial interpretations creates new business for lawyers and legal assistants without regard to the business cycle.

Earnings

Earnings of legal assistants vary greatly. Salaries depend on the training and experience the legal assistant brings to the job, the type of employer, and the geographic location of the job. Generally, legal assistants who work for large law firms or in large metropolitan areas earn more than those who work for smaller firms or in less populated regions.

According to an Abbott, Langer, and Associates survey, legal assistants had a median income of about $21,200 a year in 1983. The lowest 10 percent earned $15,000 or less, while the highest 10 percent earned $30,000 or more.

Legal assistants hired by the Federal Government in 1982 started at $13,000 or $16,100 a year, depending on their training and experience. The average annual salary of legal assistants who worked for the Federal Government in 1982 was about $26,300.

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Related Occupations
Several other occupations also call for a specialized understanding of the law and the legal system but do not require the extensive training of a lawyer. Some of these are abstractors, claim examiners, health and regulatory inspectors, occupational safety and health workers, patent agents, police officers, and title examiners.

Sources of Additional Information
General information on a career as a legal assistant and a list of legal assistant schools approved by the American Bar Association are available from:

American Bar Association, Standing Committee on Legal Assistants, 1155 East 60th St., Chicago, Ill. 60637.

For information on certification of legal assistants and schools that offer training programs in a specific State, contact:

National Association of Legal Assistants, Inc., 1420 South Utica, Tulsa, Okla. 74104.

Information on local training programs and job prospects is available from your local legal assistant association. A list of these associations can be obtained from:

National Federation of Paralegal Associations, P.O. Box 1410, Ben Franklin Station, Washington, D.C. 20044.

Library Technicians
(D.O.T. 100.367-018)

Nature of the Work
Library technicians perform many support activities involved in operating a library. They help professional librarians to acquire, organize, and make material accessible to users. Like librarians, library technicians work either in technical or user services. Those in user services work directly with the public to help find the information needed. Those in technical services acquire and prepare materials for use and deal less frequently with the public.

Library technicians are also known as *library technical assistants*. They answer questions about use of the card catalog, direct library users to standard references, perform routine cataloging of library materials, file cards in catalog drawers, verify information on order requests, and may supervise other support staff. Some library technicians operate and maintain audiovisual equipment such as projectors and tape recorders. They may also assist library users with microfilm or microfiche readers, or retrieve information from a computer data base. Technicians sometimes work on special projects. A technician with artistic ability, for example, might design posters and displays.

Working Conditions
Library technicians work with people, books, audio-visual materials and mechanical equipment. At times their jobs may be very repetitive—when calculating circulation statistics, for example. At other times, however, they may work on special projects such as designing posters and setting up displays. The job may require much standing, stooping, bending, lifting, and reaching.

Library technicians in government and other special libraries—such as those in business and law firms and research centers—usually work a regular 40-hour week, but those in public libraries and college and university libraries may work weekend and evening hours. In schools, library technicians work regular school hours.

Employment
Library technicians held about 29,000 jobs in 1982. Most worked in school or academic libraries.

In late 1982, the Federal Government employed about 3,500 library technicians. Most worked in Department of Defense libraries or in the Library of Congress.

Training, Other Qualifications, and Advancement
Although some individuals with high school education may find jobs as library technicians, most employers prefer people with at least some college training. Post-high school education has become increasingly necessary as libraries with tight budgets seek technically trained individuals who are able to assume greater responsibilities and because the number of people with college training seeking library technician jobs has increased.

Some library technicians are trained on the job. However, libraries encourage support staff members to take courses in library technology to improve their job skills.

In 1981, 82 institutions, mostly 2-year colleges, offered training for library technicians. Junior and community college programs generally lead to an associate of arts degree in library technology and include 1 year of liberal arts courses and 1 year of library-related study. Students study the purposes and organization of libraries and how they operate. They learn to order, process, catalog, and circulate library materials. Some receive training in library automation. Many learn to produce audiovisual materials such as posters, transparencies, and audio and video tapes and to use and maintain audiovisual equipment. Applicants should be aware that credits earned for an associate degree in library technology do not apply toward a professional degree in library science.

Job Outlook
Employment of library technicians is expected to grow more slowly than the average for all occupations through the mid-1990's. However, many library technicians will be needed annually to replace those who transfer to other fields, retire, or die.

Continued employment growth is expected in special libraries such as business, medical, and law libraries. Some growth is expected in school libraries as enrollments start increasing in elementary schools after 1984 and in secondary schools after 1990. Some growth will also result as technicians increasingly perform routine tasks formerly done by librarians. Little or no growth is expected in academic libraries because of declining college enrollments or in public libraries because of tight budgets.

Earnings
Salaries for library technicians vary widely depending on the size of the library or library system as well as the geographic location and size of the community.

Salaries of library technicians in the Federal Government generally were between $11,949 and $16,559 in early 1983.

Related Occupations
Library technicians keep records, catalog, sort and shelve materials, and assist library users. Other occupations with similar duties include records management technicians, information specialists, data processing control clerks,

Most employers seek people with some college education for library technical assistant jobs.

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medical records technicians, title searchers, insurance claims clerks, reservation clerks, secretaries, mail clerks, records custodians, and teacher aides.

Sources of Additional Information

Information about a career as a library technician and a directory of schools offering training programs in this field can be obtained from:

Council on Library/Media Technicians, Cuyahoga Community College, Attention Margaret R. Barron, 2900 Community College Ave., Cleveland, Ohio 44115.

For information on training programs for library-media technical assistants, write:

American Library Association, Office for Library Personnel Resources, 50 East Huron St., Chicago, Ill. 60611.

Tool Programmers, Numerical Control

(D.O.T 007.167-018)

Nature of the Work

Aircraft, automobiles, machinery, and many other goods contain metal parts. One of the most common methods of making metal parts is with machine tools—drill presses, lathes, milling machines, and others. Most of these machines are operated by semiskilled or skilled workers such as machine tool operators and machinists. A growing number of the machine tools in use, however, are numerically controlled machines in which an electronic device (a controller) controls the machine's operation. The controller "reads" a program—a coded list of the steps necessary to perform a specific machining job—and runs the machine tool's mechanisms through the steps. The efficient operation of these machine tools depends, in large part, on the skill of tool programmers, who develop the programs.

Tool programmers must have a broad knowledge of machining operations, mathematics, and blueprint reading. They must know how various machine tools operate and the working properties of metals such as steel, cast iron, and aluminum.

Programmers begin the task of writing a program by analyzing the blueprints of the item to be made by the machine. They then outline the sequence of machine operations and select the proper cutting tools needed to machine the workpiece into the desired shape. They compute the size and position of the cuts that must be made on the metal stock, and also calculate the machine speed and feed rate needed for the type of metal being used.

After they have compiled all necessary information, programmers prepare a set of instructions for the machine to follow. These instructions are then converted into the programming language used by the machine tool's controller. This set of instructions, or program, is then encoded on paper tape, punch cards, or magnetic tape. The programmer also writes an instruction list to guide the machine operator in loading and tending the machine. Finally, the programmer watches the operation of a trial run of the machine to insure that it is functioning properly and checks the output to be sure the specifications are met. Computer graphics may be used instead of a trial run to check the program.

Working Conditions

Tool programmers work in well-lighted, well-ventilated areas. The rooms in which they work generally are separated from the areas where the machine tools are in use, so they are not exposed to the noise of the factory floor. The work generally is not as strenuous as that of the workers who operate the machine tools.

Tool programmers consult reference books for information on the properties of different metals.

Employment

Tool programmers held about 12,000 jobs in 1982. Almost all worked for manufacturing firms that produce durable goods such as aircraft, metalworking machinery, and construction equipment. Most jobs for tool programmers are in large metropolitan areas where most factories are located.

Training, Other Qualifications, and Advancement

Tool programmers learn their jobs through a combination of work experience and vocational study. Employers prefer to promote or hire skilled machinists for programmer jobs. To learn programming, these experienced workers take courses at vocational schools or junior colleges; employers may pay for these courses. Because programming methods differ among the brands of numerically controlled machine tools, manufacturers often provide training in programming for employees of firms that purchase their machines. Although this is not generally considered an entry level job, some employers will hire people without machining experience if they have completed vocational school or junior college courses in tool programming and demonstrate the ability to learn machine operations. Those who have completed high school courses and have displayed ability in mathematics, physics, drafting, and blueprint reading will have the best chance of landing a job.

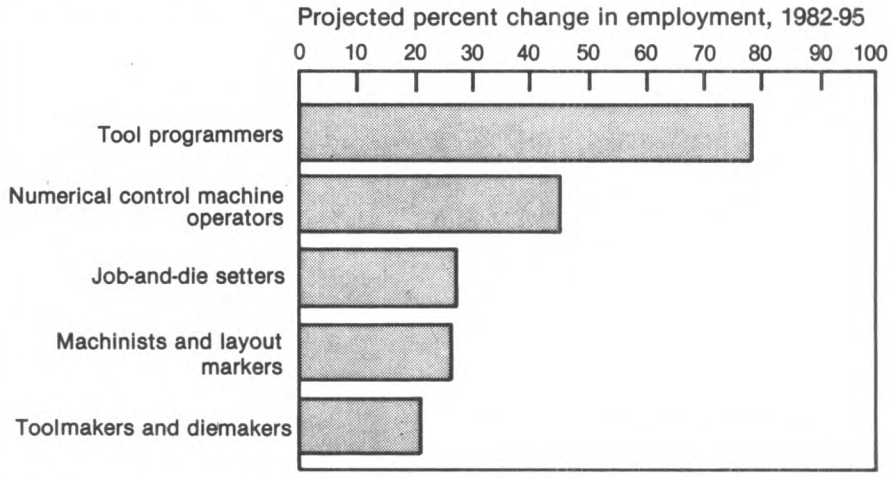
Tool programmers can advance to supervisory jobs or transfer to skilled machining jobs such as machinist and toolmaker and diemaker.

Job Outlook

Employment of tool programmers is expected to increase much faster than the average for all occupations through the mid-1990's. Besides openings arising from growth in demand for these workers many openings are expected to occur each year as programmers transfer to other fields of work, retire, or die. However, since this is a relatively small occupation, the total number of job openings will be much smaller than in other machining occupations such as machine tool operator, job and die setter, machinist, and toolmaker and diemaker.

As the economy grows, the demand for aircraft, automobiles, metalworking machinery,

Increased use of automated machine tools is expected to make tool programmers the fastest growing machining occupation.



SOURCE: Bureau of Labor Statistics

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and other products that use machined metal parts will increase. In order to compete with foreign manufacturers of these goods, American firms are expected to increase their use of numerical control and other types of automated machining equipment. This equipment will enable these firms to control their costs better and to machine parts to more exact specifications. As more firms install numerically controlled machine tools, the demand for tool programmers also will rise.

Earnings

In 1982, tool programmers who worked in metropolitan areas earned about $12.65 an hour. In comparison, the hourly rate for all production workers in private industry, except farming, was $7.67. Tool programmers generally work a 40-hour week; however, overtime is common during periods of high manufacturing activity.

Related Occupations

Tool programmers apply their knowledge of machining operations, blueprints, and machine programming to write programs that run machine tools. Other highly skilled workers involved in metal machining work are: tool-and-die designers, tool and die drawing checkers, tool planners, toolmakers and diemakers, and machinists.

Sources of Additional Information

For more information about this occupation contact:

The National Machine Tool Builders, 7901 Westpark Dr., McLean, Va. 22102.

The National Tooling and Machining Association, 9300 Livingston Rd., Ft. Washington, Md. 20744.

The National Screw Machine Products Association, 6700 W. Snowville Rd., Breckville, Ohio 44141.

The International Association of Machinists and Aerospace Workers, 1300 Connecticut Ave. NW., Washington, D.C. 20036.

OTHER TECHNOLOGISTS AND TECHNICIANS, EXCEPT HEALTH

Title	Definition	Employment 1982	Projected growth 1982–95
Civil engineering technicians	Apply theory and principles of civil engineering in planning, designing and overseeing construction and maintenance of structures and facilities under the direction of engineering staff and physical scientists.	35,000	Much faster than average
Embalmers	Prepare bodies for interment in conformity with legal requirements.	11,000	Expected to decline
Industrial engineering technicians	Study and record time, motion, methods and speed involved in performance of production, maintenance, clerical and other worker operations for such purposes as establishing standard production rates or improving efficiency. Usually works under the direction of engineering staff.	27,000	About as fast as average
Law clerks	Research legal data for briefs or arguments based on statutory law or decisions. Search for and study legal records and documents to obtain data applicable to case under consideration. Prepare rough drafts of briefs or arguments. File pleadings for firm with court clerk. Serve copies of pleadings on opposing counsels. Prepare affidavits of documents and keep document files and correspondence of cases.	40,000	Faster than average
Mechanical engineering technicians	Apply theory and principles of mechanical engineering to develop and test machinery and equipment under direction of engineering staff and physical scientists.	48,000	Much faster than average
Radio operators	Includes workers concerned with receiving and transmitting communications, using radiotelegraph or radiotelephone equipment in accordance with government regulations. May repair equipment.	6,700	About as fast as average
Title examiners and abstractors	Title Examiner: Search public records and examine titles to determine legal condition of property titles. Copy or summarize (abstracts) recorded documents, such as mortgages, trust deeds, and contracts affecting condition of title to property. May prepare and issue policy that guarantees legality of title. Abstractor: Summarize pertinent legal or insurance details or sections of statutes or case law from reference books for purpose of examination, proof, or ready reference. Search out titles to determine if title deeds are correct.	11,000	Faster than average

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Marketing and Sales Occupations

Sales work offers a wide range of career opportunities. In some sales jobs, people are their own bosses, determine their own schedules, and have their earnings depend entirely upon their performance. Other jobs are more routine, with structured work schedules and regular pay. Supervisory positions in sales enable individuals to use their leadership and administrative abilities. Managers plan, organize, and coordinate retail, wholesale, insurance, real estate and other sales activities and supervise sales workers. In all kinds of sales work, opportunities are good for flexible or part-time working hours.

This section of the *Handbook* describes sales workers in retail trade, wholesale trade, manufacturing, insurance, real estate, and securities. Also discussed are travel agents and cashiers.

Training, Other Qualifications, and Advancement

Training requirements for sales work are as varied as the work itself. For jobs selling standardized merchandise such as magazines, candy, cigarettes, and cosmetics, employers usually seek high school graduates and have experienced sales clerks train them on the job. In some large stores, they may also attend training courses. Those who sell complex products or services, such as electronic equipment or liability insurance, need substantial education and training. For some sales positions, employers seek college graduates with majors in science or engineering. For other jobs, employers seek college graduates with majors in any field, or individuals with comparable job experience, and train them on the job or in training programs. Many sales workers learn through years of on-the-job experience, often supplemented by home study, employer training, and college courses. Thus, a real estate agent may take university extension courses; a department store beauty counselor may participate in an industry-sponsored training program; and a jewelry sales worker may learn through years of observation and experience on the job.

Even in the most routine kinds of selling, a high school diploma is an asset to a beginner. Courses in business, marketing, and merchandising are particularly good preparation. Many high schools have work-study programs that allow students to work part time in local businesses while attending classes in retailing. The proportion of sales workers who are college graduates has risen rapidly, from about 12 percent in 1970 to 24 percent in 1982. This is due in part to a need for more highly trained workers in some jobs. It also reflects the fact that many more college graduates are seeking sales jobs.

Personal attributes are extremely important in sales occupations—more so than in many other jobs. Sales workers must be outgoing, enthusiastic, and persuasive. They have to be poised and at ease with strangers, and good at striking up a conversation and relating to other people. Success in sales takes initiative, energy, self-confidence, and self-discipline. Arithmetic skills are an asset. Sales workers often find their sales ability and product knowledge can be used in a variety of jobs. For example, a retail trade furniture sales worker may become a furniture manufacturers' sales representative.

Job Outlook

Employment in most sales occupations is expected to rise about as fast as the average for all occupations through 1995. In addition to jobs resulting from growth, millions of openings will occur each year as experienced workers transfer to other occupations, retire, or die.

Earnings

For some jobs in sales, such as sales clerks, earnings are usually low—many pay at or only a little above the minimum wage, $3.35 an hour in 1982. For others, such as wholesale and manufacturers' sales workers, and insurance and securities sales workers, earnings can be as high for professional workers such as accountants and engineers.

Cashiers

(D.O.T. 211.362-010, .367-010, .462, .467, .482; and 249.467-010)

Nature of the Work

Supermarkets, department stores, movie theaters, and restaurants are among the many businesses that employ cashiers to handle payments from customers. Most cashiers receive money, make change, fill out charge forms, and give receipts. The related occupation of bank teller is discussed elsewhere in the *Handbook*.

In addition to these duties, cashiers, depending on their place of employment, may do other work and have different job titles. Those employed in theaters, for example, often called *box office cashiers* or *ticket sellers*, operate ticket-dispensing machines and answer telephone inquiries. Restaurant cashiers, sometimes called *cashier checkers* may handle reservations for meals and special parties, type menus, or sell items at the candy and cigarette counter. In supermarkets and other self-service stores, cashiers known as *checkout clerks, checkers*, or *grocery clerks* wrap or bag purchases. They also may restock shelves and mark prices, rearrange displays of merchandise, and take inventory. In many offices, *agency* or *front-office cashiers* type, operate the switchboard, do bookkeeping, and act as receptionists.

Cashiers operate several types of machines. Many use cash registers that print the amount of the sale on a paper tape. A rapidly growing number of cashiers operate electronic registers, computerized point-of-sale registers, or computerized scanning systems. Depending upon its complexity, a computerized system may automatically calculate the necessary taxes and the change due as well as record inventory numbers and other information. Such registers are replacing less versatile, conventional models in many stores. Cashiers who work in hotels and hospitals use machines that record charges for telephone, medical, and other services and prepare itemized bils. Cashiers may also operate adding and change-dispensing machines.

Working Conditions

Most cashiers work indoors, often in small booths or behind counters located near store entrances. They may have to stand for long periods of time. In some cases, they are exposed to cold drafts in the winter and considerable heat during the summer.

Employment

In 1982, cashiers held about 1,570,000 jobs. Supermarkets and other foodstores employed the largest number. However, cashiers are needed in businesses and organizations of all types and sizes, and many find jobs in department stores, drugstores, shoestores, hardware stores, furniture stores, gasoline service stations, and other kinds of retail stores. Restaurants, hotels, theaters, schools, and hospitals also employ a large number of cashiers. Businesses employing cashiers are located in large cities, suburban shopping centers, small towns, and rural areas. The Federal Government employs a small number, primarily in the Department of Defense, in clubs, cafeterias, and exchanges on military installations.

Opportunities for part-time work are very good. More than one-half of all cashiers worked part time.

Training, Other Qualifications, and Advancement

Cashier jobs tend to be entry-level positions requiring little or no experience and little education. Although there are no specific educational requirements, employers prefer beginning cashiers with high school diplomas. Courses in business arithmetic, bookkeeping, typing, and other business subjects are good preparation for cashier jobs. Training is offered

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as part of many public school vocational programs.

Cashier jobs attract individuals who want to gain work experience or to earn money while in school or while tending to household responsibilities. Typically, about one-half of all job openings are filled by persons who are 19 years or younger, and almost three quarters are 24 years or younger. About 1 in 4 cashiers is a student. Relatively few transfer into this occupation from other jobs.

Many employers offer on-the-job training. In a small firm, the beginner is trained on the job by an experienced worker. In large firms, training programs often include classroom instruction in the use of electronic or computerized registers and in other phases of the work. Sometimes employers seek persons who have special skills or business experience, such as typing or selling. Many openings, especially full-time positions, are filled by promoting qualified part-time workers.

Persons who want to become cashiers should be able to do repetitious work accurately. They need finger dexterity, a high degree of eye-hand coordination, and an aptitude for working with figures. Because they meet the public, cashiers should be neat in appearance and able to deal tactfully and pleasantly with customers.

Promotion opportunities for cashiers tend to be limited. However, the job affords a good opportunity to learn an employer's business and so may serve as a steppingstone to a more responsible job, such as bookkeeper or manager. Cashiers working in chainstores and other large retail businesses, for example, may advance to department or store managers.

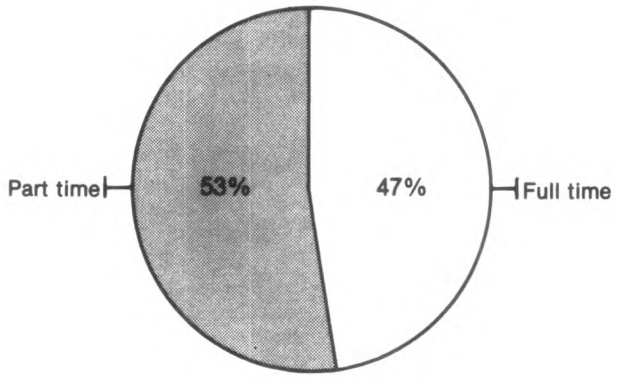
Cashiers should be able to do repetitious work accurately.

Job Outlook

More job openings are to be available for cashiers than for almost any other occupation through the mid-1990's. The occupation is large, and employment is expected to grow faster than the average for all occupations. Projected population growth as well as rising personal incomes will create a demand for goods and services requiring cashiering services. However, the vast majority of openings will occur as cashiers transfer to other occupations or leave the labor force. As is the case for other sales clerks, the proportion of cashiers who leave the occupation each year is very high; about one-third of cashiers leave their job annually—more than one and one-half times the rate for all workers. Most who leave the labor force assume full-time household responsibilties or return to school. Cashiers also transfer to other jobs at a higher than the average rate. Opportunities for part-time employment are expected to continue to be very good.

Employment of cashiers, despite projected faster than average growth, will not keep pace with the expected increase in the volume of goods and services sold because of the wider use of computerized checkout systems. These systems which are replacing cash registers in many supermarkets are likely to be introduced in other kinds of retail establishments. An optical or magnetic scanner transmits the code number (Universal Product Code-UPC) of each purchase to a computer that is programmed to record a description and price of the item, add the tax, and print out a receipt. The computer also keeps track of the store's inventory and places orders with the warehouse when stock is needed. Employment in the retail food store

More than half of all cashiers work part time.



SOURCE: Bureau of Labor Statistics

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industry is not as sensitive to fluctuations in the economy as in many other industries, since people must eat whether they have a job or not.

Earnings

Beginning cashiers often earn only the minimum wage. The minimum in establishments covered by the Federal law was $3.35 an hour in 1982. In addition, minimum wages in many establishments are governed by State law. Where State minimums are higher, the establishment pays at least that rate. Cashiers earn wages ranging from the minimum to several times that amount. Median weekly earnings for full-time cashiers were about $176 in 1982; the middle 50 percent earned between $137 and $250; 10 percent earned above $350.

Wages for union cashiers are generally higher than those for nonunion cashiers. Experienced full-time cashiers who were members of the United Food and Commercial Workers International Union, to which many cashiers belong, earned average wages of $9.57 per hour in 1982; beginners averaged $4.99 per hour. Cashiers generally receive health insurance, annual and sick leave, pension benefits, and similar benefits available to other workers.

Hours of work may vary depending on needs of the employer. Cashiers in theaters, restaurants, and foodstores often work during rush periods such as holidays, weekends, late afternoons, and evenings; many work part time or on split shifts. Full-time cashiers in supermarkets and other large retail stores usually work a 5-day, 40-hour week; however, they may work on weekends and have time off during the week.

Related Occupations

Cashiers receive and pay money and keep account of such exchanges. Other workers with similar duties include bank tellers, ticket sellers, post office clerks, toll collectors, sales clerks.

Sources of Additional Information

Details about employment opportunities are available from local businesses and the local office of the State employment service.

Insurance Agents and Brokers

(D.O.T. 250.257-010)

Nature of the Work

Most people have their first contact with an insurance company through an agent or broker. These professionals help individuals or companies select the right policy for their needs. Insurance agents and brokers sell policies that provide individuals and businesses with financial protection against loss. They plan for the financial security of individuals, families, and businesses; advise about insurance protection for an automobile, home, business, or other property; prepare reports and maintain records; or help a policyholder obtain settlement of an insurance claim. Specialists in group policies may help an employer provide employees the opportunity to buy insurance through payroll deductions.

Insurance agents have contracts with specific insurance companies; brokers are independent business persons who sell for many insurance companies and 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 sell one or more of the three basic types of insurance: Life, property-liability (casualty), and health. Life insurance agents offer policies that pay survivors when a policyholder dies. Depending on the policyholder's circumstances, a life policy also can be designed to provide retirement income, funds for the education of children, or other benefits. Casualty insurance agents sell policies that protect individuals and businesses from financial losses as a result of automobile accidents, fire or theft, or other losses, as well as industrial or commercial lines, covering workers' compensation, product liability, or medical malpractice. Many life and casualty agents also sell health insurance policies covering the costs of hospital and medical care or loss of income due to illness or injury. Many agents may also be licensed to sell securities, such as mutual fund shares or annuities. (Life insurance agents are sometimes called life underwriters; see the statement on underwriters elsewhere in the *Handbook*.)

Working Conditions

Agents do a considerable amount of local travel to meet with clients. They generally arrange their own hours of work, and often schedule evening and weekend appointments for the convenience of clients. Many agents work more than 40 hours a week.

Employment

Insurance agents and brokers held about 361,000 jobs in 1982. Many work part time, especially beginners who have other jobs while they attempt to build up a clientele. About 1 agent in 4 is self-employed. While most agents and brokers specialize in life insurance, a growing number of agents (called multiline agents) offer both life and property-liability policies. The following tabulation presents the percent distribution of wage and salary jobs by industry.

	Percent
Total	100.0
Insurance carriers	71.6
Life insurance	60.1
Fire, marine, and casualty insurance	8.0
Accident and health insurance and medical service plans	2.9
Other insurance carriers	.6
Insurance agents, brokers, and services	26.7
Real estate	1.1
Combined real estate, insurance, loan, and law offices	.6

Agents and brokers are employed in cities and towns throughout the country, but most work in or near large population centers. Almost all insurance agents and brokers work out of local company offices or independent agencies.

Training, Other Qualifications, and Advancement

Although many employers prefer college graduates for jobs selling insurance, most hire high school graduates with potential or proven sales ability or those who have been successful in other types of work. In fact, most entrants have transferred from other occupations. Understandably, they tend to be older, on average, than entrants to other occupations.

Many colleges and universities offer courses in insurance, and some schools offer a bachelor's degree in insurance. College courses in finance, accounting, economics, business law, government, and business administration enable the insurance agent to relate insurance to other personal finance problems and to economic conditions. Courses in psychology, sociology, and public speaking can prove useful in improving sales techniques. College training may help the agent grasp the fundamentals and procedures of insurance selling more quickly.

All agents and brokers must obtain a license in the State 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. Agents who plan to sell mutual fund shares and other securities also must be licensed by the State. New agents usually receive training at the agencies where they work and frequently also at the insurance company's home office. Beginners sometimes attend company-sponsored classes to prepare for examinations. Others study on their own and accompany experienced sales workers 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. This program emphasizes practical selling skills. There also are courses in health insurance and advanced sales techniques. The National Association of Health Underwriters awards the Registered Health Underwriter (RHU) designation to those individuals who successfully complete a series of courses. Life insurance agents or brokers can qualify for the Chartered Life Underwriter (CLU) designation or a relatively new designation, Chartered Financial Consultant (ChFC), by passing a series of examinations given by the American College of Bryn Mawr, Pa. The latter designation reflects knowledge of tax laws, estate planning, securities, and other subjects as insurance agents and brokers become increasingly involved in all areas of financial planning. Property-liability agents can qualify for the Chartered Property Casualty Underwriter (CPCU) designation by passing a series of examinations given

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Insurance agents periodically review and reevaluate the insurance needs of their clients.

by the American Institute for Property and Liability Underwriters. The RHU, CLU, ChFC, and CPCU designations are recognized marks of achievement in their respective fields. Another designation, Accredited Advisors in Insurance, is also available. Agents and brokers can qualify for this by passing a series of three 1-semester courses covering principles of insurance production, multiple-lines insurance production, and agency operation and marketing. A growing number of States have mandatory continuing education requirements.

Agents and brokers should be enthusiastic, self-confident, disciplined, hard working, and able to communicate effectively. They should be able to inspire customer confidence. Some companies give personality tests to prospective employees because personality attributes are important in sales work. Since agents usually work without supervision, they must be able to plan their time well and have initiative to locate new clients.

An insurance agent who shows sales ability and leadership may become a sales manager in a local office. A few agents advance to agency superintendent or executive positions. However, many who have built up a good clientele prefer to remain in sales work. Some, particularly in the property-liability field, establish their own independent agencies or brokerage firms.

Job Outlook

Employment of insurance agents and brokers is expected to grow about as fast as the average for all occupations through the mid-1990's as the volume of insurance sales continues to expand. Most job openings, however, are expected to result from the need to replace agents and brokers who leave the occupation. Most transfer to other occupations; many are beginners unable to establish a sufficiently large clientele in this highly competitive business. Opportunities should be best for ambitious people who enjoy sales work and who develop expertise in a wide range of insurance and financial services.

Future demand for agents and brokers depends on the volume of insurance sales. The volume of life and health insurance should increase rapidly over the next decade as many more workers enter the 25-54 age group. People in this group have the greatest need for life and health insurance, and protection for homes, automobiles, and other valuables. Life insurance sales also should grow as more families select policies designed to provide retirement income and educational funds for their children. Additional life insurance sales will also reflect the growing need for life insurance and disability protection for working women. Rising incomes as well as a concern for financial security also may stimulate sales of mutual funds, variable annuities, and other financial products and services. Sales of property-liability insurance should rise as more people seek coverage not only for their homes and cars but also for expensive, advanced technology products such as home computers and video recorders, and as complex types of commercial coverage, such as product liability, workers' compensation, prepaid legal, kidnap, and pollution liability insurance are expanded.

Employment of agents and brokers may not keep pace with the rising level of insurance sales because more policies will be sold to groups and by mail. In addition, each agent should be able to handle more business as computers take over more routine clerical tasks. The trend toward multiline agents also will cause employment to rise more slowly than the volume of insurance sales.

Most individuals and businesses consider insurance a necessity, regardless of economic conditions. Therefore, agents are not likely to face unemployment because of a recession.

Earnings

Beginners in this occupation often are guaranteed a moderate salary while they learn the business and build a clientele. In 1982, many large companies paid new agents a median salary of about $1,200 a month during this training period, which usually lasts about 6 months, and subsidized their agents at that level for about 30 months providing they meet established goals. Thereafter, most agents are paid on a commission basis. 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. Life insurance agents with 5 or more years of experience had a median income of $35,000 in 1982, but thousands of agents and brokers earned more than $50,000 a year, and many earned more than $100,000. Casualty insurance agents usually earned higher incomes.

Agents and brokers generally pay their own automobile and travel expenses. Independent brokers must also pay office rent, clerical salaries, and other operating expenses out of their earnings.

Most agents have paid vacations, group life and health insurance plans, and retirement pensions. The size of most pensions depends on how much insurance an agent sells.

Related Occupations

Other workers who sell complex or expensive products or services include real estate agents and brokers, securities sales workers, financial advisors, estate planning specialists, and manufacturers' sales workers.

Sources of Additional Information

General occupational information about insurance agents and brokers is available from the home office of many life and property-liability insurance companies. Information on State licensing requirements may be obtained from the department of insurance at any State capital.

Information about a career as a life insurance agent also is available from:

American Council of Life Insurance, 1850 K St. NW., Washington, D.C., 20006.

The National Association of Life Underwriters, 1922 F St. NW., Washington, D.C. 20006.

For career information on property-liability agents, contact:

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

Independent Insurance Agents of America, 100 Church St., New York, N.Y. 10007.

Alliance of American Insurers, 20 N. Wacker Dr., Chicago, Ill. 60606.

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The National Association of Independent Insurers, Public Relations Department, 2600 River Rd., Des Plaines, Ill. 60018.

Professional Insurance Agents, 400 N. Washington St., Alexandria, Va. 22314.

Manufacturers' Sales Workers

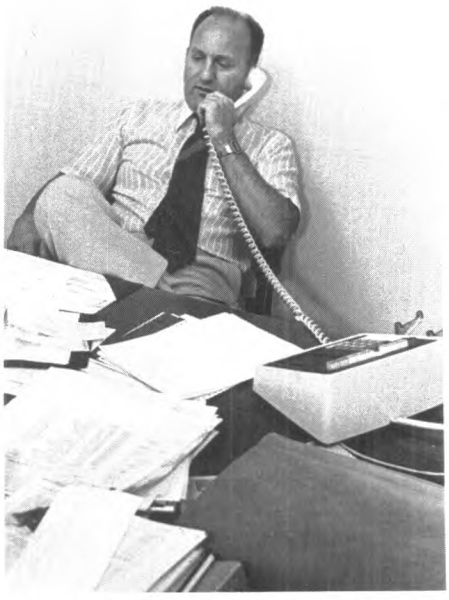
(D.O.T. 260 through 279.357)

Nature of the Work

Practically all manufacturers employ sales workers. Manufacturers' sales workers sell mainly to other businesses—factories, banks, wholesalers, and retailers. They also sell to institutions—hospitals, schools, libraries, and other institutions.

Manufacturers' sales workers visit prospective buyers to inform them about the products they sell, analyze the buyers' needs, suggest how their products can meet these needs, and take orders. Sales workers visit firms in their territory, using an approach adapted to their line of merchandise. Those who handle crackers or cookies, for example, emphasize their wholesomeness, attractive packaging, and variety. Sometimes sales workers promote their products at trade shows and conferences.

Sales workers who deal in technical products, such as electronic equipment, often are called industrial sales workers. Some engineers, often called sales engineers, also sell technical products. In addition to providing information on their firms' products, they help prospective buyers with technical problems. For example, they may recommend improved materials and machinery for a firm's manufacturing process, draw up plans of proposed machinery layout, and estimate cost savings from buying their equipment. They present this information to company officials and negotiate a sale, a process which may take many months. They may work with engineers in their own companies, adapting products to a customer's special needs. Technical sales workers sometimes train customers' employees to operate and maintain new equipment, and make frequent visits to make certain that it is functioning properly.



The earnings of many manufacturers' sales workers depend on how much they sell.

Manufacturers' sales workers spend most of their time visiting prospective customers. They also prepare reports on sales prospects or customers' credit ratings, plan their work schedules, draw up lists of prospects, make appointments, handle correspondence, and study literature about their products.

Working Conditions

Some manufacturers' sales workers have large territories and do considerable traveling. They may be away from home for several days or weeks at a time. Others usually work near their "home base." Manufacturers' sales workers 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 are able to plan their schedules for time off when they want it.

Employment

Manufacturers' sales workers held 414,000 jobs in 1980. Some worked out of their company's home office, often located at a manufacturing plant. The majority, however, worked out of branch offices, usually in big cities near prospective customers.

Large numbers of sales workers are employed by the printing and publishing, chemicals, fabricated metal products, electrical, and other machinery industries, as well as the transportation and food products industries. In addition, there are many independent sales representatives who are self-employed and who work for a straight commission based on the dollar amount of their sales.

Training, Other Qualifications, and Advancement

Although a college degree is increasingly desirable for a job as a manufacturers' sales worker, many employers hire individuals without a degree who have appropriate work experience. Most entrants to this occupation, even those with college degrees, transfer from other occupations, but some are recent graduates. Entrants are older, on average, than entrants to other occupations. Manufacturers of nontechnical products usually seek persons with degrees in liberal arts or business administration. Manufacturers of technical products usually seek those with degrees in science or engineering. Drug sales workers, also known as pharmaceutical detailers, usually need a background in biology and chemistry. Manufacturers of electrical equipment, heavy machinery, and some types of chemicals prefer to hire people who have studied engineering, physics, or chemistry. (Information on chemists, engineers, and others with the technical training suitable for work as manufacturers' sales workers is given elsewhere in the *Handbook*.)

Many companies, especially those that manufacture technical products, have formal training programs for beginning sales workers that last 2 years or longer. In some programs, trainees rotate among jobs in plants and offices to learn all phases of production, installation, and distribution of the product. In others, trainees take formal classroom instruction at the plant, followed by on-the-job training in a branch office under the supervision of a field sales manager.

A pleasant personality and appearance and the ability to get along well with people are important. Because sales workers may have to walk, stand for long periods, or carry product samples, some 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 with managerial ability eventually may advance to sales manager or other executive positions; many top executives in industry started as sales workers.

Frequent contact with business people in other firms helps sales workers transfer to other jobs. Some go into business for themselves as independent representatives. Others find opportunities in advertising and marketing research.

Job Outlook

Employment in this field is expected to grow more slowly than the average for all occupations through 1995. Industrial firms, chainstores, and institutions that purchase large quantities of goods at one time frequently buy directly from the manufacturer. The need for sales workers should continue as manufacturers emphasize sales activities to compete for the growing number of these valuable accounts. However, some manufacturers have switched to wholesalers to sell their products, particularly during economic downturns, decreasing the need for manufacturers' sales workers.

Many openings will occur each year because of the need to replace workers who transfer to other occupations, retire, or die. As is the case for other sales jobs, this is a large occupation and turnover is fairly high. Each year, a number of new manufacturers' sales workers discover that they are not cut out for selling and leave the occupation. Because sales are affected by changing economic conditions and consumer preferences, employment opportunities and earnings may fluctuate from year to year.

Earnings

Earnings of manufacturers' sales workers depend on the type of compensation plan. Some manufacturers pay experienced sales workers a straight commission, based on the dollar amount of their sales (as in the case of independent representatives); others pay a fixed salary. Most use a combination of salary and commission; salary and bonus; or salary, commission, and bonus. Bonus payments may depend on individual performance, on the performance of

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all sales workers in the group or district, or on the company's performance.

Median annual earnings of full-time manufacturers' salesworkers were about $24,000 in 1982, the middle 50 percent earned between $17,000 and $33,000 a year; 10 percent earned less than $13,000; and 10 percent earned more than $44,000 a year. According to a survey conducted by the American Management Association, total compensation (salary plus bonus or commission) for inexperienced sales workers ranged between $16,300 and $20,600 a year in 1981. Experienced sales workers received between $24,300 and $27,800, while sales supervisors earned between $35,400 and $41,200 during the same year. The highest total compensation was generally paid by industrial goods manufacturers.

Related Occupations

Manufacturers' sales workers must have sales ability and a specific knowledge of the products they sell. Some related occupations that require these skills are buyers, field-contact technicians, wholesale trade sales workers, real estate sales workers, insurance sales workers, and securities sales workers.

Sources of Additional Information

For details about work opportunities for manufacturers' sales workers, contact manufacturers in your area.

Real Estate Agents and Brokers

(D.O.T. 186.117-058; 250.157-010, .357-014 and -018)

Nature of the Work

A house or an apartment, whether purchased as a residence or an investment property to be rented out, is the single most expensive item in most people's budgets. Thus, people generally seek the help of a real estate agent or broker when buying or selling a home. These workers have a thorough knowledge of the housing market in their community. They know which neighborhoods will best fit their clients' lifestyles and budgets, local zoning and tax laws, and where to obtain financing for the purchase. Agents and brokers also act as a medium for price negotiations between buyer and seller.

Brokers are independent business people who not only sell real estate owned by others, but also rent and manage properties, make appraisals, and develop new building projects. In closing sales, brokers often arrange for loans to finance the purchases, for title searches, and for meetings between buyers and sellers when details of the transactions are agreed upon and the new owners take possession. A broker's resourcefulness and creativity in arranging financing that is most favorable to the prospective buyer often mean the difference between success and failure in closing a sale. In some cases, agents assume the responsibilities in closing sales. Brokers also manage their own offices, advertise properties, and handle other business matters. Some combine other types of work, such as the sale of insurance or the practice of law, with their real estate business.

Real estate agents generally are independent sales workers who contract their services with a licensed broker. Today, relatively few agents work as employees of a broker or realty firm.

In selling or renting real estate, agents generally first meet with potential buyers to get a feeling for the type of home they would like and can afford. Then, they may take the client to see a number of homes that appear to meet the needs and income of the client. Because real estate is so expensive, agents may have to meet several times with a prospective buyer to discuss properties. In answering questions, agents emphasize those selling points that are likely to be most important to the buyer. To a young family looking at a house, for example, they may point out the convenient floor plan and the fact that schools and shopping centers are close by. To a potential investor seeking the tax advantages of owning a rental property, they may point out the proximity to the city and the ease of finding a renter. Whenever bargaining over price becomes necessary, agents carefully follow the seller's instructions and may present counteroffers in order to get the best possible price.

There is more to agents' jobs, however, than just selling. Since they must have properties to sell, agents spend a significant amount of time obtaining "listings" (owner agreements to place properties for sale with the firm). Much time is spent on the telephone exploring leads gathered from advertisements and personal contacts. When listing property for sale, agents make comparisons with similar property being sold to determine its fair market value.

Most real estate agents and brokers sell residential property. A few, usually in large firms, specialize in commercial, industrial, agricultural, or other types of real estate. Each specialty requires knowledge of that particular type of property and clientele. Selling or leasing business property, for example, requires an understanding of leasing practices, business trends, and location needs. Agents 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, religious institutions, shopping facilities, and public transportation, and be familiar with tax rates and insurance coverage.

Working Conditions

Although real estate agents and brokers generally base their operations in offices, most of their time is spent outside the office—showing properties to clients, evaluating properties for sale, meeting with prospective clients, and performing a wide range of other duties. Brokers provide office space, but agents generally furnish their own automobiles.

Agents and brokers often work more than 50 hours a week. In addition, they often work evenings and weekends to suit the convenience of their clients.

Employment

Real estate agents and brokers held about 337,000 jobs in 1982. Many worked part time.

Most real estate firms are relatively small; indeed, some brokers operate a one-person business. Some large firms have several hundred real estate agents operating out of many branch offices. About one-third of all brokers have franchise agreements with national or regional real estate organizations. Under this type

Many real estate agents work part time.

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of arrangement, similar to many fast-food restaurant operations, the broker pays a fee in exchange for the privilege of using the more widely known name of the parent organization. Although franchised brokers often receive help in training salespeople and in running their offices, they bear the ultimate responsibility for the success or failure of the firm.

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 agents and brokers must be licensed in every State and in the District of Columbia. All States require prospective agents to be a high school graduate, be at least 18 years old, and pass a written test. The examination—more comprehensive for brokers than for agents—includes questions on basic real estate transactions and on laws affecting the sale of property. Most States require candidates for the general sales license to complete at least 30 hours of classroom instruction and those seeking the broker's license to complete 90 hours of formal training in addition to a specified amount of experience in selling real estate (generally 1 to 3 years). Some State waive the experience requirements for the broker's license for applicants who have a bachelor's degree in real estate. State licenses generally must be renewed every year or two, usually without reexamination. Some States, however, require continuing education for license renewal.

Persons who take real estate sales positions are older, on average, than entrants to most other occupations. Many homemakers and retired persons are attracted by the flexible work schedules characteristic of this field. Many of these people enter, leave, and later reenter the occupation, depending on the strength of the housing market, family responsibilities, and other personal factors. In addition to labor force entrants and reentrants, others transfer into real estate sales jobs from a wide range of occupations.

As real estate transactions have become more complex, many of the large firms have turned to college graduates to fill sales positions. A large number of agents have some college training, and the number of college graduates selling real estate has risen substantially in recent years. However, personality traits are fully as important as academic background. Brokers look for applicants who possess such characteristics as 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 keenly competitive field. Agents also should have a good memory for names and faces and business details, such as taxes, zoning regulations, and local land-use laws.

Persons interested in beginning jobs as real estate agents 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, including the use of computers to locate or list available properties, under the direction of an experienced agent.

Many firms offer formal training programs for both beginners and experienced agents. Larger firms generally offer more extensive programs than smaller firms. Over 1,000 universities, colleges, and junior colleges offer courses in real estate. At some, a student can earn an associate 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, property development and management, and other subjects also are available through various National Association affiliates.

Trained and experienced agents can advance in many large firms to sales or general manager. Persons who have received their broker's license 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 investment counseling.

Job Outlook

Employment of real estate agents and brokers is expected to rise faster than the average for all occupations through the mid-1990's in order to satisfy the growing sales and rental demand for housing and other properties. However, most job openings will occur each year as workers transfer to other occupations, retire, or stop working for other reasons. Many beginners become discouraged by their inability to close a sufficient number of sales and subsequently leave the occupation.

Employment growth in this field will stem primarily from increased demand for home purchases and rental units. Shifts in the age distribution of the population over the next decade will result in a larger number of young adults with careers and family responsibilities. This is the most geographically mobile group in our society and the one that traditionally makes most of the home purchases. As their incomes rise, these people also may be expected to invest in additional real estate. During periods of declining economic activity and tight credit, the volume of sales and the resulting demand for sales workers may decline. During these periods, the number of persons seeking sales positions may outnumber openings.

Real estate sales positions should continue to be relatively easy to obtain. Not everyone is successful selling real estate, however; well-trained, ambitious people who enjoy selling should have the best chance for success. The proportion of part-time real estate agents has declined in recent years as brokers have demanded greater skill and professionalism from those selling real estate. This decline is expected to continue as agents need more specialized knowledge to handle real estate transactions.

Earnings

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 agents and brokers. The broker and agent in the firm that obtained the listing generally share their part of the commission when the property is sold; the broker and agent in the firm that made the sale also generally share their part of the commission. 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.

The median salary of full-time real estate agents was about $17,000 a year in 1982. Real estate brokers earned nearly $34,000 a year. The most successful agents and brokers earn considerably more. Some firms, especially the large ones, furnish group life, health, and accident insurance.

Income usually increases as an agent gains experience, but individual ability, economic conditions, and the type and location of the property also affect earnings. Sales workers 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 an agent 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.

Related Occupations

Selling expensive items such as homes requires certain personal characteristics including maturity, tact, and a sense of responsibility. Other sales workers who find these character traits important in their work include automobile sales workers, securities sales workers, insurance agents and brokers, yacht brokers, travel agents, and manufacturers' representatives.

Sources of Additional Information

Details on licensing requirements for real estate agents and brokers are available from most local real estate organizations or from the State real estate commission or board.

For more information about opportunities in real estate work, as well as a list of colleges and universities offering courses in this field, contact:

National Association of Realtors, 430 North Michigan Ave., Chicago, Ill. 60611.

Retail Trade Sales Workers

(D.O.T. 260 through 290.477, and 299.677-014)

Nature of the Work

The success of any retail business depends largely on its sales workers. Courteous and efficient service from behind the counter or on

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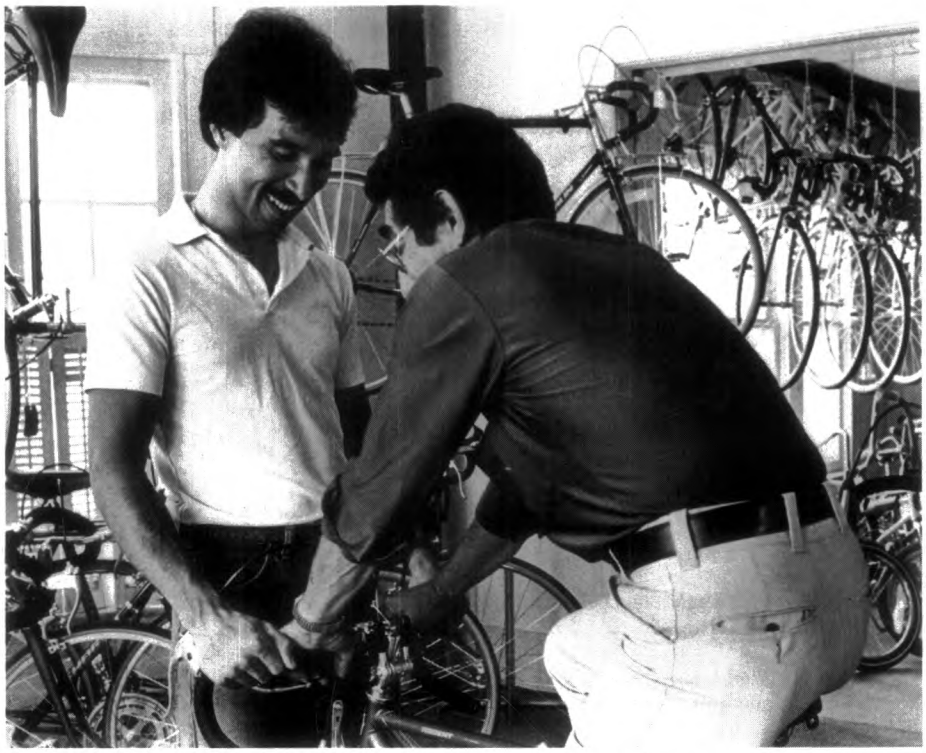
the sales floor does much to satisfy customers and build a store's reputation.

Whether selling furniture, electrical appliances, or clothing, a sales worker's primary job is to interest customers in the merchandise by describing its construction, demonstrating its use, and showing various models and colors. For some jobs, particularly those selling expensive "big ticket" items, special knowledge or skills are needed. Stereo equipment sales workers, for example, must have sufficient knowledge of electronics to explain features of various brands and models, and the meaning of manufacturers' specifications to customers. However, in jobs selling standardized articles such as food, hardware, linens and housewares, sales workers often do little more than take payments and wrap purchases. (Cashiers also wrap or bag purchases, receive payments, and make change. See the statement on cashiers elsewhere in the *Handbook*.)

In addition to selling, most retail sales workers make out sales checks, receive cash payments, and give change and receipts. They also handle returns and exchanges of merchandise and keep their work areas neat. In small stores, they may help order merchandise, stock shelves or racks, mark price tags, take inventory, and prepare displays.



The success of any retail business depends largely on its sales workers.

Working Conditions

Most sales workers in retail trade work in clean, comfortable, well-lighted stores. Some, however, work outside the store. Kitchen equipment sales workers may visit prospective customers' homes, for example, to help them plan renovations, and used-car sales workers may spend much time at an outdoor lot. Many sales workers must stand for long periods.

Although many sales workers have a 5-day, 40-hour week, in some stores, the standard workweek is longer. Because Saturday is a busy day in retailing, employees usually work that day and have a weekday off. Longer than normal hours may be scheduled before Christmas and during other peak periods. Some, especially those employed by stores in suburban shopping centers, regularly work one evening or more a week.

Part-time sales workers generally work during peak hours of business—daytime rush hours, evenings, and weekends.

Employment

Retail sales workers held 3,367,000 jobs in 1982. They worked in stores ranging from the small drug or grocery store employing one part-time sales person to the giant department store with hundreds of sales workers. In addition, some were self-employed representatives of direct sales companies and mail-order houses.

The largest employers of retail trade sales workers are department and other general merchandise stores, apparel and accessories stores, food, drug, and furniture stores, and car dealers. Sales workers in motor vehicle dealerships are discussed elsewhere in the *Handbook*.

The following tabulation shows the distribution of wage and salary retail trade jobs by industry.

Department stores	859,000
Grocery stores	239,000
Women's ready-to-wear stores	202,000
Drug and proprietary store	190,000
Motor vehicle dealers (new and used)	155,000
Shoe stores	131,000
Variety stores	111,000
Family clothing stores	105,000
Furniture and home furnishing stores except appliances	96,000
Auto and home supply stores	71,000
Lumber and other building materials dealers	69,000
Men's and boys' clothing and furnishings stores	66,000
Radio, television, and music stores	64,000
Liquor stores	61,000
Hardware stores	60,000
Retail bakeries	58,000
All other retail stores	830,000

Most of the sales workers who sell "big-ticket" items work full time; three-fifths of other sales workers work part time.

Retail sales jobs are distributed geographically much the same way as the population; most sales workers are employed in cities and their nearby suburbs.

Training, Other Qualifications, and Advancement

For many persons, a job as a retail sales worker serves as a source of income rather than a career. Most entrants are under 25 years of age. Many have little or no work experience and are students or homemakers looking for part-time work.

Thousands of high schools across the country have distributive education programs, generally a cooperative arrangement between the school and businesses. Students work part time at local stores while taking courses in merchandising, accounting, and other aspects of retailing. The experience and education gained can improve their prospects for permanent employment.

Many distributive education programs are available in adult and continuing education programs. In addition, a federally funded project called "70,001" focuses on the training needs of disadvantaged youth and high school dropouts. In collaboration with schools and colleges across the Nation, this program offers full-time employment with part-time instruction after hours.

Persons interested in sales jobs should apply to the personnel offices of large retail stores, where they are likely to be interviewed and, in some cases, given an aptitude test. Employers prefer persons who enjoy working with people and have the tact to deal with difficult customers. Among other desirable characteristics are an interest in sales work, a pleasant personality, a neat appearance, and the ability to communicate clearly.

In most small stores, an experienced employee or the proprietor instructs newly hired sales personnel in making out sales checks and operating the cash register. In many larger stores, training programs are more formal and include specialized training in selling certain products.

Inexperienced sales workers in department stores typically begin in housewares, notions, and other departments where a customer needs little assistance. As they gain experience and seniority, they move to positions of greater responsibility. The most experienced—and the highest paid—sales workers sell "big ticket" items such as large appliances, furniture, and rugs. This work requires the most knowledge of

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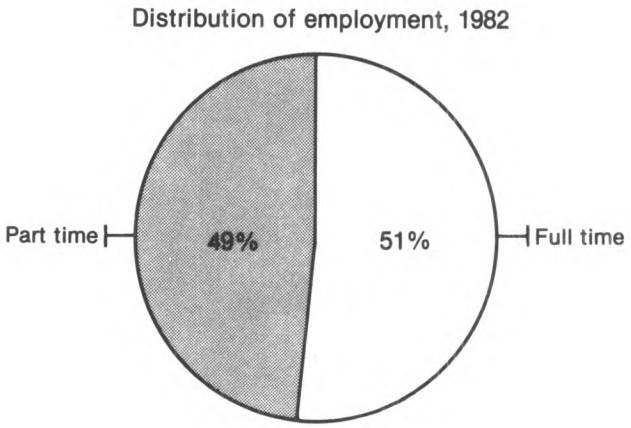
Almost half of all retail trade sales workers have part-time jobs.



SOURCE: Bureau of Labor Statistics

the product and the greatest talent for persuasion.

Traditionally, capable sales workers without a college degree could advance to management positions. However, a college education is now becoming increasingly important for advancement. Large retail businesses generally prefer to hire college graduates as management trainees. Despite this trend, capable employees with less than a college degree should still be able to advance to administrative or supervisory work in large stores.

Opportunities for advancement are limited in small stores where one person, often the owner, does most of the managerial work. Retail selling experience may be an asset in qualifying for sales work with wholesalers or manufacturers.

Job Outlook

Employment of retail trade sales workers is expected to grow about as fast as the average for all workers through 1995. While the volume of goods sold is expected to grow rapidly, the adoption of self-service and computerized checkout systems by more retailers will limit the need for additional sales workers. However, employment in stores selling "big ticket" items will be much less affected since these items are not likely to be sold self-service.

Retail trade sales work will continue to provide more job openings than almost any other occupation through the mid-1990's. Prospects for sales jobs are good because retail selling is a large occupation and turnover is high. There will continue to be many opportunities for part-time workers, as well as for temporary workers during peak selling periods such as the Christmas season.

During recessions, the volume of sales and the resulting demand for sales workers may decline. Purchases of durable goods and "big ticket" items, such as cars and appliances, are likely to be postponed during difficult economic times. In areas of high unemployment, sales of all types of goods may decline. Layoffs, however, are unlikely. Since sales worker turnover is usually very high, employers often can cut employment simply by not replacing all those who leave.

Earnings

In 1982, the starting wage for most retail sales positions (including part time and temporary) not covered by union contracts was the Federal minimum wage, $3.35 an hour. Some stores doing less than $362,500 in business per year paid less, since they are not required to pay the minimum wage. Median weekly earnings of full-time sales workers in stores selling mostly "big ticket" items were about $300 in 1982; the middle 50 percent earned between $215 and $420 a week; 10 percent earned less than $160 a week; and 10 percent earned more than $530 a week. In other types of stores, sales workers tend to earn less since their jobs do not require much sales ability or technical knowledge of the product. Median weekly earnings of full-time sales workers in stores selling mostly other products were about $190; the middle 50 percent earned between $140 and $270 a week; 10 percent earned less than $115; and 10 percent earned more than $390 a week.

Some sales workers receive salary plus commissions—that is, a percentage of the sales they make. Others are paid only commissions. Those paid by commission may find their earnings greatly affected by ups and downs in the economy.

Sales workers in many retail stores may buy merchandise at a discount, often from 10 to 25 percent below regular prices. This privilege sometimes is extended to the employee's family. Some stores, especially the large ones, pay part or all of the cost of life insurance, health insurance, and a pension.

Related Occupations

Sales workers apply a general knowledge of sales techniques and specific knowledge of the products they sell. These skills are used by people in a number of other occupations, including demonstrators, route drivers, real estate sales agents, telephone solicitors, buyers, insurance agents and brokers, and manufacturers' representatives.

Sources of Additional Information

Information on careers in retail sales may be obtained from the personnel offices of local stores; from State merchants' associations; or from local unions of the United Food and Commercial Workers International Union.

Information on distributive education programs may be obtained from your State employment service.

A list of schools that offer programs in retailing is available from:

U.S. Department of Education, Division of Vocational/Technical Education, Washington, D.C. 20202.

For information about a "70,001" program in your area, write:

"70,001" Limited, 600 Maryland Ave. SW., Washington, D.C. 20024.

Securities Sales Workers

(D.O.T. 251.157-010)

Nature of the Work

Most investors—whether they are individuals with a few hundred dollars or large institutions with millions to invest—call on securities sales workers when buying or selling stocks, bonds, shares in mutual funds, or other financial products. Securities sales workers often are called *registered representatives, account executives*, or *brokers*.

When an investor wishes to buy or sell securities, sales workers may relay the order through their firms' offices to the floor of a securities exchange, such as the New York Stock Exchange on Wall Street. If a security is not traded on an exchange, the sales worker sends the order to the firm's trading department which trades it directly with a dealer in the over-the-counter market. After the transaction has been completed, the sales worker notifies the customer of the final price.

Securities sales workers also provide many related services for their customers. Depending on a customer's knowledge of the market, they may explain the meaning of stock market terms and trading practices; offer financial counseling; devise an individual financial portfolio for the client including securities, life insurance, tax shelters, mutual funds, annuities, and other investments; and offer advice on the purchase or sale of a particular security.

Not all customers have the same investment goals. Some individuals may prefer long-term investments designed either for capital growth or to provide income over the years; others might want to invest in short-term securities

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that they hope will rise in price quickly. Securities sales workers furnish information about the advantages and disadvantages of an investment based on each person's objectives. They also supply the latest price quotations on any security in which the investor is interested, as well as information on the activities and financial positions of the corporations issuing these securities.

Securities sales workers may serve all types of customers or they may specialize in one type only, such as institutional investors. In institutional investing, most sales workers specialize in a specific financial product such as stocks, bonds, options, annuities, or commodity futures. Some handle the sale of new issues, such as corporation securities issued to finance plant expansion.

Beginning securities sales workers spend much of their time searching for customers—relying heavily on t elephone solicitation. They may meet some clients through business and social contacts. Many sales workers find it useful to get additional exposure by teaching adult education investment courses or giving lectures at libraries or social clubs.

Working Conditions

Securities sales workers usually work in offices where there is much activity. Sales workers have access to "quote boards" or computer terminals that continually provide information on the prices of securities. When sales activity increases, due perhaps to unanticipated changes in the economy, the pace may become very hectic.

Established sales workers usually work the same hours as others in the business community. Beginners who are seeking customers may work much longer hours, however. Most sales workers accommodate customers by meeting with them in the evenings or on weekends.

Employment

Securities sales workers held about 78,000 jobs in 1982. In addition, a substantial number of people in other occupations also sold securities. These include partners and branch office managers in securities firms as well as insurance agents and brokers offering securities to their customers.

Securities sales workers are employed by brokerage and investment firms in all parts of the country. Many of these firms are very small. Most sales workers, however, work for a small number of large firms with main offices in big cities (especially in New York) and approximately 9,300 branch offices in other areas.

Training, Other Qualifications, and Advancement

Because securities sales workers must be well informed about economic conditions and trends, a college education is increasingly important, especially in the larger securities firms. In fact, the overwhelming majority of entrants to this occupation are college graduates. Although employers seldom require specialized academic training, courses in business administration, economics, and finance are helpful.

Many employers consider personal qualities and skills more important than academic training. Employers seek applicants who have good communication skills, are well groomed, and have a strong desire to succeed. Self-confidence and an ability to handle frequent rejections also are important ingredients for success.

Because maturity and the ability to work independently also are important, many employers prefer to hire those who have achieved success in other jobs. Some firms prefer candidates with sales experience, particularly those who have worked on commission in areas such as real estate or insurance. Understandably, the overwhelming majority of entrants to this occupation transfer from other jobs. Some begin working as securities sales workers following retirement from other fields.

Securities sales workers must meet State licensing requirements, which generally include passing an examination and, in some cases, furnishing a personal bond. In addition, sales workers must register as representatives of their firm 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 General Securities Examination, or examinations prepared by the securities exchanges or the NASD. Large national brokerage firms may require a second examination—the Uniform Securities Agents State Law Examination—that allows sales workers to do business nationwide. These tests measure the prospective representative's knowledge of the securities business, customer protection, and recordkeeping procedures.

Most employers provide on-the-job training to help sales workers meet the requirements for registration. Because potential earnings are high in this occupation, competition for available training spots usually is keen. In most firms, the training period is at least several months. Trainees in large firms may receive classroom instruction in securities analysis, effective speaking, and the finer points of selling, take courses offered by business schools and other institutions and associations, and undergo a period of on-the-job training lasting up to 2 years. In small firms, sales workers generally receive training in outside institutions and on-the-job training.

Sales workers periodically take training, through their firms or outside institutions, to keep abreast of new financial products as they are introduced on the market. Training in the use of computers is important as the securities sales business is highly automated.

The principal form of advancement for securities sales workers is an increase in the number and size of the accounts they handle. Although beginners usually service the accounts of individual investors, eventually they may handle very large institutional accounts such as those of banks and pension funds. Some experienced sales workers become branch office managers and supervise other sales workers while continuing to provide services for their own customers. A few representatives advance to top management positions or become partners in their firms.

Job Outlook

The number of securities sales workers is expected to grow faster than the average for all occupations through the mid-1990's. Most job openings, however, are expected to be created by those who transfer to other jobs, retire, die, or stop working for other reasons. Due to the highly competitive nature of securities sales work, many beginners leave the field because

Securities sales workers spend a lot of time on the telephone with clients.

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they are unable to establish a sufficient clientele. Once established, however, securities sales workers have a relatively strong attachment to their occupation because of high earnings and the considerable investment in training.

Employment of securities sales workers is expected to expand as economic growth and rising personal incomes increase the funds available for investment. Growth in the number and size of institutional investors will be particularly strong as more people enroll in pension plans, establish trust funds, and contribute to the endownment funds of colleges and other nonprofit institutions. 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. Job opportunities should be best for mature individuals with successful work experience.

The demand for securities sales workers fluctuates as the economy expands and contracts. Thus, in an economic downturn the number of persons seeking jobs usually exceeds the number of openings—sometimes by a great deal. Over the long run, however, job opportunities for securities sales workers are expected to be favorable. During severe slumps in market activity, sales workers who are able to provide their clients with complete financial services should enjoy greater job prospects and income stability than those who rely solely on commissions from stock transactions.

Earnings

According to the Securities Industry Association, earnings of full-time, experienced securities sales workers who serviced individual investors averaged over $60,000 a year in 1982. The relatively small number of sales workers who serviced institutional accounts averaged about $150,000.

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 $900 to $1,200 a month.

After candidates are licensed and registered, their earnings depend on commissions from the sale or purchase of stocks and bonds, life insurance, or other 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 sales workers 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.

Related Occupations

Similar sales jobs requiring specialized knowledge include insurance agents and real estate agents. Other occupations in the securities business are broker floor representatives and commodities brokers.

Sources of Additional Information

Further information concerning a career as a securities sales worker is available from:

Securities Industry Association, 120 Broadway, New York, N.Y. 10271. (There is a $1 charge for this material.)

Career information also may be obtained from the personnel departments of individual securities firms.

Travel Agents

(D.O.T. 252.157-010)

Nature of the Work

Planning your vacation or a business trip can be frustrating and time consuming. Many travelers, therefore, seek the assistance of travel agents—specialists who have the information and know-how to make the best possible travel arrangements, with their clients' tastes, budgets, and other requirements in mind.

Consider, for example, the contrast between arrangements for an executive with a tight schedule and those for a family of four on a restricted budget, both planning a visit to Washington, D.C. The executive might want to fly first class, stay in a hotel suite he or she could use for business meetings, and have a limousine ready upon arrival to make business calls. The agent would make the necessary arrangements, and perhaps send the bill to the executive's company. For the family, on the other hand, the travel agent would recommend less expensive, off-season, all-inclusive packages and special air fares. The agent would describe a wide range of hotel facilities and arrange the most economical but pleasurable trip. The agent also would arrange for car rental or escorted bus tours, suggest local tourist attractions and restaurants, and acquaint the family with the city's climate.

For international travel, the agent would also provide information on customs regulations, required papers (passports, visas, and certificates of vaccination), and the most recent currency exchange rates.

When making travel arrangements, travel agents consult a variety of sources for information on departure and arrival times, fares, and hotel ratings and accommodations. They often use their own travel experiences as a basis for making recommendations. Travel agents, may devote some of their time to visiting different hotels, resorts, and restaurants to rate their comfort, cleanliness, and quality of food and service.

Travel agents also do considerable promotional work. They may give slide or movie presentations to social and special interest groups, arrange advertising displays, and meet with business managers to suggest company-sponsored trips.

Working Conditions

Travel agents spend most of their time behind a desk conferring with clients, completing paperwork, contacting airlines and hotels for travel arrangements, and promoting group tours. Many agents, especially those who are self-employed, frequently work long hours. When they do travel, travel agents usually get substantially reduced rates. Sometimes hotels or resorts offer travel agents free promotional holidays.

Employment

Travel agents held 62,000 jobs in 1982. A very small portion of these people worked as travel accommodation appraisers who evaluated various hotels and restaurants.

Though travel agents work in every part of the country, they are concentrated in major population centers where the best business opportunities exist. About one-half of all travel agencies are in large cities; one-third, in suburban areas; and one-fifth, in small towns and rural areas.

Some travel agents are self-employed. Generally, these persons gained experience and recognition in an established travel agency before going into business for themselves.

Training, Other Qualifications, and Advancement

Travel courses are offered in vocational schools, adult education programs in public high schools, community colleges, and 4-year colleges. A few colleges offer a bachelor's degree in travel, service/marketing, and tourism. Although few college courses relate directly to the travel industry, a college education is sometimes preferred by employers. Courses in geography, foreign languages, history, and computer science are most useful. Courses in accounting and business management also are important, especially for those who expect to start their own travel agencies. Several home-study courses provide a basic understanding of the travel industry.

Persons can prepare for careers as travel agents by working part time as reservation clerks or receptionists in travel agencies. As they gain experience, they may enter either a formal or informal training program given by the agency, take on greater responsibilities, and eventually assume the full workload of a travel agent. Experience as an airline reservation agent also is a good background for a travel agent. Broad experience as a national or international traveler is an asset, since the ability to speak with some personal knowledge about a city or foreign country often helps to influence clients' travel plans.

As a sales representative, the travel agent must be pleasant and patient. Agents often must demonstrate their efficiency and sense of responsibility to hard-to-please clients.

Experienced travel agents can take an advanced course, leading to the designation of Certified Travel Counselor, offered by the Institute of Certified Travel Agents. Another recognized mark of achievement in this field is a certificate of proficiency from the American Society of Travel Agents. It is awarded to those who pass four tests covering the duties of travel agents.

Travel agents who start their own agencies must gain formal conference approval before

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Travel agents spend much of their time making arrangements with airlines and hotels.

they can receive commissions. Conferences are organizations of airlines, shiplines, or rail lines. The International Air Transport Association, for example, is the conference of international airlines. To gain conference approval, an agency must be in operation, be financially sound, and employ at least one experienced travel agent.

Since conference approval can take time to obtain, most self-employed agents make very little profit in their first year. Their income generally is limited to commissions from hotels and tour operators and to nominal fees for making complicated arrangements. For those starting their own agency, working capital of more than $30,000 will be needed to carry the agency through a profitless first year.

There are no Federal licensing requirements for travel agents. However, Ohio and Hawaii now have licensing requirements. In California, travel agents not approved by a conference are required to have a license.

Job Outlook

Employment of travel agents is expected to grow faster than the average for all occupations through the mid-1990's. Many job openings will arise as new agencies open and existing agencies expand, but most will occur as experienced agents transfer to other occupations, leave the labor force, or die. However, since the industry generally is sensitive to the fluctuations of the economy, opportunities at any given time depend heavily upon whether or not people can afford to travel. Long-distance travel plans are likely to be deferred during economic downturns.

Despite economic fluctuations, spending on travel is expected to increase significantly through the mid-1990's. As business activity expands, so will business-related travel. Also, with rising incomes and increasing emphasis on leisure-time activities, more people are expected to travel—and to do so more frequently—than in the past.

The use of charter flights and larger, more efficient planes, especially for trips to other countries, has brought air transportation within the budget of many Americans. The recent easing of government regulation of air fares and routes should also help increase traveling by fostering greater competition among airlines to offer better and more affordable service. More travel agents will be needed to handle this extra business. In addition, American travel agents and travel wholesalers often organize tours for the growing number of foreign visitors.

Earnings

Earnings of travel agents who own their agencies depend mainly on commissions from airlines and other carriers, tour operators, and lodging places. Commissions for domestic travel arrangements are about 10 percent; for cruises, about 10 percent; for hotels, sightseeing tours, and car rentals, 10 percent; and for international travel, about 8 percent. When travel agents arrange individual plans that require several connections on different transportation modes, they generally charge the customer a service fee for the time and expense involved. For most services, however, commissions constitute the agent's only compensation.

During the first year or two, while awaiting conference approval, self-employed travel agents generally have very low earnings. Even established agents experience less profitable years during periods of economic downturn.

Experience, sales ability, and the size and location of the agency determine the salary of travel agent. Based on limited information, salaries of travel agents generally ranged from $10,000 to over $20,000 a year in 1983. Salaried agents usually have standard benefits—pension plans, insurance coverage, paid vacations—that self-employed agents must provide for themselves.

Related Occupations

Travel agents organize and schedule business, educational or recreational travel or activities. Other workers with similar responsibilities include secretaries, tour guides, airline reservation agents, rental car agents, and travel counselors.

Sources of Additional Information

For further information on training opportunities, contact:

American Society of Travel Agents, 4400 MacArthur Blvd. NW., Washington, D.C. 20007.

Wholesale Trade Sales Workers

(D.O.T. 260 through 279.357)

Nature of the Work

Sales workers in wholesale trade help move goods from the factory to the consumer. They represent wholesalers who distribute to stores selling directly to the consumer. A wholesale drug sales worker, for example, may sell many brands of drugs, soap, and cosmetics to local pharmacies. Likewise, a wholesale construction materials distributor sells lumber, bricks, glass, and other construction materials to builders who would otherwise have to deal with many manufacturers.

Wholesale trade sales workers visit buyers for retail, industrial, and commercial firms, and institutions such as schools and hospitals. They show samples, pictures, or catalogs that list items their company stocks. They may also show customers how their products can save money and improve productivity. For example, when selling electrical machinery, they may demonstrate how new equipment would cut the firm's costs. These sales workers seldom urge customers to purchase any particular product, since they handle a large number of items. Instead, they offer prompt, dependable service so buyers will become regular customers.

Wholesale sales workers perform many services for retailers, such as checking the store's stock and ordering items that will be needed before the next visit. Some wholesale sales workers help retailers improve and update ordering and inventory systems and advise them about advertising, pricing, and window and counter displays. Sales workers who handle machinery may give technical assistance on installation and maintenance.

Sales workers keep records of sales, forward orders to their wholesale firms, prepare reports

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and expense accounts, plan work schedules, draw up lists of prospects, make appointments, and study literature describing their products. Some collect payments for their companies.

Working Conditions

Sales workers often have long, irregular work hours. Although they call on customers during business hours, they may travel at night or on weekends in order to meet their schedules. However, most sales workers seldom are away from home for more than a few days at a time. They may spend evenings writing reports and orders, carry heavy catalogs and sample cases, and be on their feet for long periods.

Employment

Wholesale trade sales workers held 1,093,000 jobs in 1982. Firms selling machinery to industrial and business users are the largest employers of wholesale sales workers. Other large employers are companies that sell food products, motor vehicles and parts, hardware and plumbing, and electrical goods. In addition, self-employed sales workers, who sell products of manufacturers for a commission, accounted for about 1 out of 10 jobs.

Most wholesale trade sales workers operate out of the home office of their firm, which usually is located in a large city. Sales workers may cover a territory in a small section of a city with many retail stores and industrial users; or, in less populated regions, they may cover half a State or more.

Most wholesale trade sales workers must be familiar with a large number of products.

Training, Other Qualifications, and Advancement

The background needed for sales jobs varies by product line and market. Complex products require technical backgrounds. Drug wholesalers, for example, seek people with a college degree in chemistry, biology, or pharmacy as trainees. Wholesalers provide training on characteristics of their products and how to sell them. For nontechnical products such as food, sales ability and familiarity with manufacturers and brands are more important than knowledge about the product itself.

Most wholesale sales workers get their jobs by working up the ladder, or by transferring into the firm if they have the appropriate background. Some employers hire high school graduates for nonselling jobs or as sales trainees. These beginners usually work in several kinds of nonselling jobs before being assigned to sales. They may start in the stockroom or shipping department to become familiar with the thousands of items the wholesaler carries or in the bookkeeping department to learn about prices and recordkeeping. They are likely to work on "inside" sales, writing telephone orders, before they actually observe and work with experienced sales workers on visits to customers. Usually, it takes 2 years or longer to prepare trainees for outside selling.

In very large wholesale firms, sales trainees participate in formal training programs that combine classroom instruction with short rotations in nonselling jobs. In most firms, however, trainees learn informally by observing experienced workers and trying the different aspects of the work. As they become familiar with customers and procedures, they gradually take on the full responsibility of the job.

Experienced sales workers also transfer from manufacturing and retail trade sales positions. Their experience with a particular product line gives them an advantage over the newcomers to the field because they don't require much on-the-job training.

Sales workers sometimes can augment their on-the-job training with college courses relevant to wholesale distribution. Trade associations also sponsor training programs.

Experienced sales workers with leadership and sales ability may advance to supervisor, sales manager, or other executive positions.

Job Outlook

The number of wholesale sales workers is expected to grow faster than the average for all occupations through 1995, as the volume and kinds of goods produced in the economy expand. Businesses and institutions will require a wide variety of products for their own use and for eventual resale. Most firms will continue to purchase these products from wholesaler-distributors. Also, manufacturers are expected to rely more extensively on wholesalers, including independent sales representatives, who sell manufacturers' products solely on a commission basis. In addition to new positions created by increased demand for wholesale trade sales workers, most openings each year will result as experienced sales workers transfer to other jobs, retire, or stop working for others reasons. The number of replacements will be quite large because the occupation is large and turnover is very high.

Earnings

Compensation plans differ among firms. One plan is salary plus a commission based on sales; others are straight commission or straight salary. Some include a bonus. Although most wholesale sales workers have steady, year-round work, sales (and commissions) on products like air-conditioners fluctuate through the year. To provide sales workers with a steady income, many companies pay them a "draw" against annual commissions.

Median weekly earnings of full-time wholesale trade sales workers were about $410 in 1982; the middle 50 percent earned between $300 and $530 a week; 10 percent earned less than $220; and 10 percent earned more than $700 a week.

Related Occupations

In addition to sales ability, wholesale trade sales workers often have a knowledge of hundreds of similar products. Some occupations requiring the same skills are buyers, sales-service promoters, manufacturing sales workers, field contact technicians, and demonstrators.

Sources of Additional Information

Information on jobs in wholesale selling may be obtained directly from local wholesale houses or from associations of wholesalers in many of the larger cities.

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OTHER MARKETING AND SALES OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Appraisers, real estate	Appraise improved or unimproved real property to determine its value for purchase, sale, investment, mortgage, or loan purposes.	32,000	Faster than average
Brokers and market operators, commodities	Buy and sell commodities on commission at customers' orders through commodity exchange. Notify customers when additional margins required because of price fluctuations and changes in governmental regulations.	5,800	Faster than average
Broker's floor representatives, securities traders and securities specialists	Buy or sell securities on floor of exchange and over-the-counter market. Study market conditions to determine buy or sell points of securities and to determine long range trends of market. In the case of the broker's floor representative, a license issued by the state is required. The securities specialist buys and sells assigned securities where prices are out of line in order to stabilize the market.	13,000	About as fast as average
Contribution solicitors	Contact individuals and firms by telephone, in person, or by other means to solicit funds for charitable organizations.	7,700	About as fast as average
Crating-and-moving estimators	Solicit freight or storage business by visiting homes or business establishments to estimate cost of packing, crating, moving, shipping, and delivering household goods, machinery, or other material. May estimate storage or shipping space required.	7,200	Faster than average
Managers, automotive parts department	Manage retail automotive parts establishment or department of repair shop or service station. Requisition new stock; verify cash receipts and keep sales records; hire, train, and discharge workers. May sell parts.	44,000	Faster than average
Restaurant, cafe, and bar managers	Supervise and coordinate the activities of workers in a restaurant, coffee shop, or an establishment selling alcoholic beverages for consumption on the premises.	574,000	About as fast as average
Sales managers, retail trade	Formulate merchandising activities in a retail establishment. Determine markup and markdown percentages necessary to insure profit, amount of merchandise to be stocked, and direct buyers in purchase of supplies for resale.	271,000	Faster than average
Store managers	Manage retail store, performing the following duties personally or through subordinates: hire, train, and discharge employees; plan work schedules and supervise workers; prepare purchase orders; formulate price policies; etc.	971,000	Faster than average
Vendors	Sell refreshments, programs, cushions, or novelties at entertainment events, circulating among patrons and calling out articles for sale. Hand, pass or throw articles to purchasers and receive payment, making change when necessary.	7,700	More slowly than average
Wholesalers	Manage wholesale trade enterprise engaged in buying merchandise and selling it to retailers or to industrial or commercial consumers.	247,000	About as fast as average

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Administrative Support Occupations, Including Clerical

In 1982, there were about 19 million jobs in administrative support occupations, including clerical. Workers in this group prepare and keep records; operate office machines; arrange schedules and make reservations; collect, distribute, or account for money, material, mail, or messages; or perform similar administrative duties.

While administrative support jobs are located in virtually all industries, they are concentrated in the fast-growing service and finance sectors. Because of this concentration, these jobs are expected to grow more rapidly than the average for all occupations through the mid-1990's.

Employers prefer high school graduates for clerical jobs. They look for people who understand what they read, know basic spelling and grammar, and can use arithmetic. The ability to type and do neat, accurate paperwork is required for nearly all entry level positions; some employers give applicants typing or clerical aptitude tests. For jobs such as bank clerk, bookkeeper, cashier, collection worker, and statistical clerk, an ability to work with numbers is particularly important. For bank teller, hotel clerk, receptionist, and reservation and passenger agent jobs—jobs requiring constant contact with customers—employers seek persons who are pleasant, tactful, and outgoing.

Many employers prefer applicants who have some knowledge of office practices. High schools, community and junior colleges, business schools, and home study schools teach these skills. Business education programs typically include courses in typing, shorthand, clerk-typist skills, and office procedures. Work-study programs provide students with experience in a clerical job while still in school.

Whether or not they have had formal business training, beginning clerical workers generally receive on-the-job training. They learn how their employers keep records and become familiar with the kinds of business forms used. Workers may learn to operate duplicating machines, calculators, and word processing equipment, or learn stock handling or inventory control procedures.

Continuing advances in office automation have increased the demand for clerical workers who are versatile enough to learn new technologies. Secretaries and typists, for example, may periodically attend classes to learn to operate new word processing equipment, information storage systems, and other automated equipment.

Opportunities for advancement to other clerical occupations are good, and sometimes there are opportunities, especially in large establishments, to move into professional and managerial positions. Many employers facilitate career advancement by providing courses in skills needed for more demanding jobs. As workers become more highly skilled, they are assigned more difficult tasks. Junior typists, for example, may be promoted to senior typists as their speed and accuracy improve. Receptionists who learn typing and office procedures may become secretaries. Promotion to such jobs as administrative assistant, office manager, or clerical supervisor generally depends on leadership ability, work experience, and knowledge of the organization.

Sources of Additional Information

The "Where to Go for More Information" section at the beginning of the *Handbook* identifies directories of schools offering courses in secretarial science, accounting, business, data processing, and travel and tourism. For the names of organizations that can provide information about specific occupations, see the discussions of individual clerical occupations that follow.

Bank Tellers

(D.O.T. 205.362-026; 211.362-014, -018, -022, -026; 216.362-018; and 219.462-010)

Nature of the Work

Most bank customers have contact with the teller, the individual who cashes checks and processes deposits or withdrawals. Many banks employ one or two "all-purpose" tellers; larger banks employ tellers in more specialized functions. One teller, for example, sells savings bonds; another accepts payment for customers' utility bills. A third receives deposits for Christmas club accounts; and a fourth keeps records and performs the necessary paperwork for customer loans. Others process the proliferating variety of certificates of deposit and money market accounts. Still other tellers handle foreign currencies, sell travelers' checks, or compute interest on savings accounts.

Commercial tellers, the most common kind of teller, cash customers' checks and handle deposits and withdrawals from checking and savings accounts. Before cashing a check, the teller must see that the written and numerical amounts agree, verify the identity of the person to receive payment, and be certain that the account has sufficient funds to cover the check. The teller must carefully count out the cash to avoid errors. Often a customer withdraws money in the form of a cashier's check, which the teller types up and verifies. When accepting a deposit, the teller checks the accuracy of the deposit slip and enters the total in a passbook or on a deposit receipt. Tellers may use machines to make change and total deposits. In some banks, tellers use computer terminals to record deposits and withdrawals. In other banks, they write deposit receipts and passbook entries by hand.

Tellers' duties begin before and continue after banking hours. They begin the day by receiving and counting an amount of working cash for their drawer; this amount is verified by a supervisor, usually the head teller. Tellers use this cash for payments during the day and are responsible for its safe and accurate handling. After banking hours, tellers count cash on hand, list the currency-received tickets on a settlement sheet, and balance the day's accounts. They also sort checks and deposit slips. Paying and receiving tellers may supervise one clerk or more.

Working Conditions

Although some tellers work evenings or on Saturdays, most generally work during the day, Monday through Friday. Continual communication with customers, repetitive tasks, and prolonged standing within a fairly small area characterize the job.

Employment

Bank tellers held about 539,000 jobs in 1982; about one-fifth worked part time. The following tabulation indicates the distribution of wage and salary jobs by industry.

Banking	418,000
Commerical and stock savings banks	384,000
Mutual savings banks	32,000
Establishments closely related to banks	2,000
Other banks	1,000
Credit agencies other than banks	121,000
Savings and loan associations	98,000
Personal credit agencies	22,000
Other credit agencies	1,000

Training, Other Qualifications, and Advancement

In hiring tellers, banks seek people who have good clerical skills and who are friendly and attentive. Although not required, a high school diploma is generally preferred. Most entrants to this occupation have at least a high school

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Drive-in tellers provide speedy, convenient customer services.

education and tend to be relatively young. Maturity, neatness, tact, and courtesy are also important because customers deal with tellers far more frequently than with other bank employees. Although a teller works independently, his or her recordkeeping is closely supervised. One should enjoy working with numbers and feel comfortable handling large amounts of money.

New tellers usually observe experienced workers for a few days before doing the work themselves. Training may last from a few days to 3 weeks or longer. Beginners usually start as commercial tellers; in large banks which have a separate savings teller's "cage," they may start as savings tellers. Often banks simultaneously train tellers for other clerical duties.

Experienced tellers may advance to head teller or customer service representative. Banks encourage this upward mobility by providing access to education and other sources of additional training. Outstanding tellers who have had some college or specialized training offered by the banking industry may be promoted to an officer or a managerial position. (See the statement on bank officers and managers elsewhere in the *Handbook*.)

Tellers can prepare for better jobs by taking courses accredited by the American Institute of Banking (AIB) and the Bank Administration Institute (BAI). AIB, an arm of the American Bankers Association, has over 450 chapters in cities across the country and numerous study groups in small communities. Most banks use AIB and BAI facilities. Both institutes assist local banks in conducting cooperative training programs or developing independent training programs. Some banks have their own training programs which result in teller certification—a sign of competence in this field. Experienced tellers qualify for certification by taking required courses and passing examinations.

Job Outlook

The number of bank tellers is expected to increase about as fast as the average for all occupations through the mid-1990's despite the increasing use of automatic teller machines and other electronic equipment. Qualified applicants should have good prospects for both full-time and part-time employment, since this occupation provides a relatively large number of job openings.

The overwhelming majority of job openings for tellers are expected to be created by replacement needs—characteristic of occupations that generally require limited formal education and offer relatively low pay. Most tellers who leave transfer to other occupations. Others stop working—primarily to assume household duties or return to school. Cyclical swings in the economy seem to have little immediate effect on bank activities. Consequently, tellers are generally immune to layoffs.

Earnings

In 1982, average annual earnings of full-time tellers were $10,300. The lowest 10 percent earned less than $7,900 while the top 10 percent earned over $16,800. In general, a greater range of responsibilities results in a higher salary. However, experience, length of service, and, especially, the location and size of the bank are also important.

Related Occupations

Tellers combine a knowledge of bank procedures with quickness and accuracy to exchange money, checks, and other financial items with customers. Other workers with similar duties include cashiers, toll collectors, post office clerks, auction clerks, and ticket sellers.

Sources of Additional Information

General information about banking occupations, training opportunities, and the banking industry itself is available from:

American Bankers Association, 1120 Connecticut Ave. NW., Washington, D.C. 20036.

Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

National Association of Bank Women, Inc., National Office, 500 N. Michigan Ave., Chicago, Ill. 60611.

Information on careers with the Federal Reserve System is available from:

Board of Governors, The Federal Reserve System, Personnel Department, Washington, D.C. 20551, or from the personnel department of the Federal Reserve bank serving each geographic area.

State bankers' associations can furnish specific information about job opportunities in their State. And writing directly to a particular bank to inquire about job openings can produce favorable results. For the names and addresses of banks in a specific location as well as the names of their principal officers, consult one of the following directories, which are published twice each year:

The American Bank Directory (Norcross, Ga., McFadden Business Publications).

Polk's World Bank Directory (Nashville, R.L. Polk & Co.).

Rand McNally International Bankers Directory (Chicago, Rand McNally & Co.).

Bookkeepers and Accounting Clerks

(D.O.T. 210, 214, 216, 219, and 249. D.O.T. index which begins on p. 364 lists the nine-digit codes included under this occupation.)

Nature of the Work

Every business needs systematic and up-to-date records of accounts and business transactions. Bookkeepers and accounting clerks maintain these records in journals, ledgers, and—increasingly—in the memory of a computer. They also prepare periodic financial statements showing all money received and paid out. The duties of bookkeeping workers and the "tools of the trade" vary with the size of the business. However, virtually all of these workers use calculating machines and many work with computers, using printouts and terminals.

In many small firms, a general bookkeeper handles all the bookkeeping. He or she analyzes and records all financial transactions, such as orders and cash sales. General bookkeepers also check money taken in against money paid out to be sure accounts "balance,"

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calculate the firm's payroll, and make up employees' paychecks. General bookkeepers also prepare and mail customers' bills and answer telephone requests for information about orders and bills.

In large businesses, several bookkeepers and accounting clerks work under the direction of a head bookkeeper or accountant. In these organizations, bookkeeping workers often specialize in certain types of work. Some, for example, prepare statements of a company's income from sales or its daily operating expenses. Some enter information on accounts receivable and accounts payable into a computer and review computer printouts for accuracy and completeness. Others record business transactions, including payroll deductions and bills paid and due, and compute interest, rental, and freight charges. They also may type vouchers, invoices, and other financial records.

Working Conditions

For the most part, working conditions for bookkeepers and accounting clerks are the same as those for other office employees in the same company. Bookkeeping requires sitting for long periods and involves examining detailed numerical information. Some persons may find this tiring, and eye strain may be a problem. Workers who operate older bookkeeping machines may be exposed to high noise levels. Newer equipment is relatively quiet, however.

Employment

Bookkeepers and accounting clerks held about 1,713,000 jobs in 1982. Jobs for bookkeeping workers are found throughout the economy—in business firms mostly, but also in schools, hospitals, nonprofit organizations, and government agencies. Approximately 1 bookkeeper in 3 works for a retail or wholesale firm. About a quarter of all bookkeepers and accounting clerks work part time.

Training, Other Qualifications, and Advancement

High school graduates who have taken business arithmetic, bookkeeping, and principles of accounting meet the minimum requirements for most bookkeeping jobs. Some employers prefer applicants who have completed accounting programs at the community or junior college level or those who have attended business school. The ability to use bookkeeping machines and computers is an asset. A knowledge of typing also is useful.

Training for this occupation is widely available. Bookkeeping is taught in high schools, community and junior colleges, and business schools and colleges. Business education programs typically include bookkeeping-accounting, business arithmetic, office practices, and principles of data processing and computer operation for office workers. Some programs give business students an opportunity to learn on the job through work-study programs arranged by high schools and local businesses. The work experience, together with the first-hand knowledge of office procedures, can help when students look for jobs after graduation.

In a few States, bookkeepers and accounting clerks who work on tax returns must be licensed. State licensing agencies can provide information on the requirements in your area.

Bookkeeping workers need to be good at working with numbers and concentrating on details. Small mistakes can be very serious in this field, so bookkeepers need to be careful, accurate, and orderly in their work. Because they often work with others, bookkeepers should be cooperative and able to work as part of a team.

Newly hired bookkeeping workers begin by recording routine transactions such as accounts receivable or accounts payable. As they gain experience, they advance to more responsible assignments, such as preparing income statements, reconciling accounts, and reviewing computer printouts.

Some bookkeeping workers are promoted to supervisory jobs. Others who enroll in college accounting programs may advance to jobs as accountants. Bookkeeping experience provides a good background for college courses in accounting but normally cannot be credited towards a degree in accounting.

Job Outlook

Employment of bookkeepers and accounting clerks is expected to grow more slowly than the average for all occupations through the mid-1990's. Job prospects should be good, nonetheless, in view of the large number of openings that will occur because of the need to replace workers who transfer to other occupations or stop working. Employment patterns are much like those in other clerical occupations and reflect the fact that bookkeepers and accounting clerks are predominantly female. As in most other clerical occupations, there is considerable movement in and out of the labor force due to homemaking responsibilities. Since the occupation is exceptionally large, replacement needs produce numerous openings.

The volume of business transactions is expected to grow rapidly, with a corresponding increase in the need for accounting records. However, the need for bookkeeping workers, who maintain these records, will not increase nearly as fast because of the increasing use of advanced computers that process data more accurately, rapidly, and economically than older computers or workers processing it by hand.

Earnings

Beginning accounting clerks in private firms averaged $11,190 a year in 1983. Salaries are higher for more complex jobs, up to an average of $19,455 a year for top-level accounting clerks.

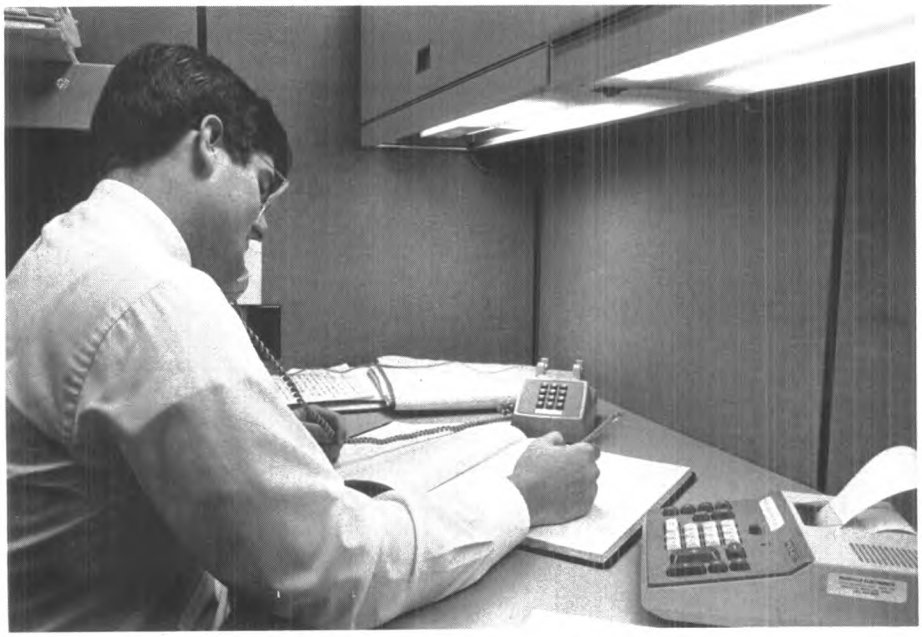
Median annual earnings of full-time bookkeepers were about $13,000 in 1982; the middle 50 percent earned between $10,000 and $16,000 a year. Ten percent earned less than $8,000 and 10 percent more than $21,000.

In 1982, the Federal Government paid accounting clerks with 2 years of experience or postsecondary education a starting salary of about $12,000 a year.

According to a survey by the International Personnel Management Association, in 1982 the average beginning salary for account clerks in municipal, State, and Federal Government was $11,364 a year; the average salary for experienced workers was $14,496. An Administrative Management Society survey showed entry-level accounting clerks averaged $11,856 a year in 1982, while accounting clerks with more responsibility averaged $14,040.

Related Occupations

Workers in a number of other jobs also must be good at working with numbers. Among such workers are bank tellers, collection workers, insurance clerks, and statistical clerks.



Calculators are essential tools for bookkeepers and accounting clerks.

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Sources of Additional Information

State employment service offices can provide information about job openings for bookkeeping workers.

Computer Operating Personnel

(D.O.T. 203.382-018, .582-022, -026, -030, -070; 206.387-030; 208.685-030; and 213.132-010 and -014, .362-010, .382-010, and .685-010)

Nature of the Work

All computer systems require specialized workers to enter data and instructions, operate the computer, and retrieve the results. The data to be processed and the instructions for the computer are called "input;" the results are called "output."

Information is entered into a computer system by data entry personnel in a variety of ways. In some systems, keypunch operators using a machine similar to a typewriter prepare input by punching patterns of holes in computer cards to represent specific letters, numbers, and special characters. In others, data typists use special machines that convert the information they type to holes in cards or magnetic impulses on tapes or disks. In some systems, data enter the computer at the source of the transaction being recorded, for example, at the loading dock or at a supermarket checkout line. Workers entering data in this manner often are in other occupations—cashiers, for example.

Once the input is coded—prepared in a form the computer can read—it is ready to be processed. Computer operators, who monitor and control the computer, set up the equipment for each job following the special instructions that the programmer has written out. To process the input, they make sure the computer has been loaded with the correct cards, magnetic tapes, or disks. While it is running, they watch the computer console, paying special attention to signals, such as error lights, that could indicate a malfunction. If the computer stops or an error is signalled, operators must locate the problem and solve it or terminate the program. In most systems, devices such as high-speed printers and disk drives that are directly connected to the computer provide input and output in the form desired by the programmer. These devices are run by peripheral equipment operators.

Working Conditions

Because electronic computers must be operated at carefully controlled temperatures, computer operating personnel work in well-ventilated rooms; air-conditioning counteracts the heat generated by machine operations. When the equipment is operating, however, the computer room can be noisy.

Some computer and peripheral equipment operators work evening or night shifts because many organizations use their computers 24 hours a day.

Employment

Computer operating personnel held 580,000 jobs in 1982: Computer operators 211,000, peripheral equipment operators 49,000, and data entry operators 320,000. About 1 of every 7 data entry operators worked part time.

Although computer and peripheral equipment operators and data entry operators are employed in almost every industry, most work in manufacturing firms, banks, insurance firms, colleges and universities, wholesale and retail trade establishments, and firms that provide data processing services for a fee.

Training, Other Qualifications, and Advancement

In some firms, other clerical workers such as tabulating and bookkeeping machine operators may be transferred to jobs as data entry, peripheral equipment, or computer operators. Most often, however, employers recruit workers who already have some of the necessary skills to operate the equipment.

Many high schools, public and private vocational schools, private computer schools, business schools, and community or junior colleges offer training in computer operating skills. The military services also offer valuable training in a number of computer skills. In addition, a growing number of business firms across the country hold weekend seminars on data processing for high school students.

Employers in private industry usually require a high school education, and many prefer to hire computer operators who have some community or junior college training, especially in data processing. The Federal Government requires a high school diploma, unless applicants have had specialized training or experience. Many employers test applicants to determine their aptitude for computer work, particularly their ability to reason logically. Data entry personnel often are tested for their ability to work quickly and accurately.

Beginners usually are trained on the job. The length of training needed varies—peripheral equipment operators can learn their jobs in a few weeks, but computer operators require several months of training because they must become sufficiently familiar with the computer equipment to be able to identify the causes of equipment failures.

Data entry and peripheral equipment operators should be able to work under close supervision as part of a team. They also must feel comfortable working with machines and doing repetitive, organized tasks. Computer operators, however, must use independent judgment, especially when working without supervision on second and third shifts.

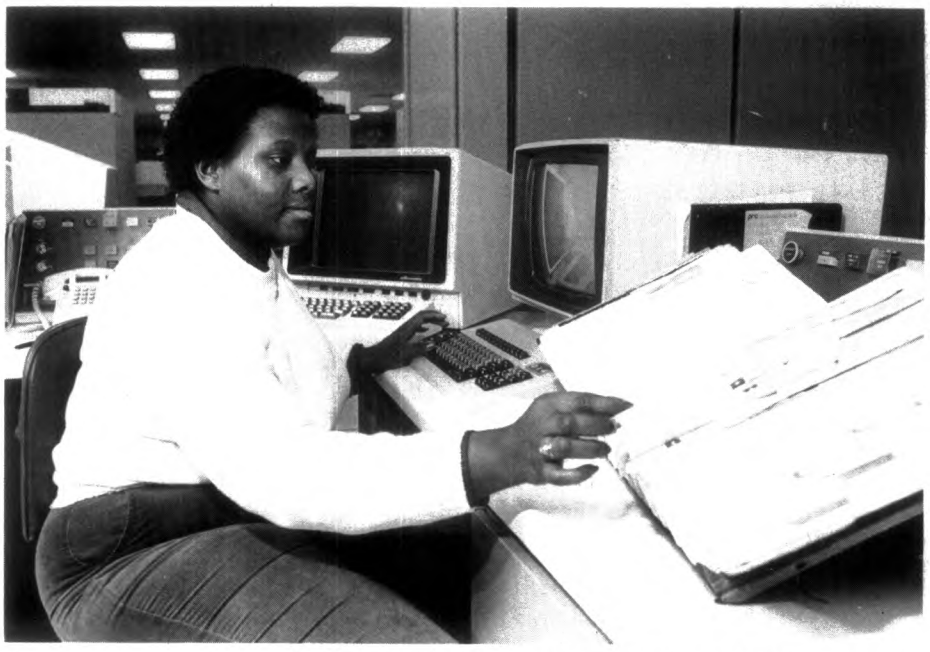
Advancement opportunities for data entry and peripheral equipment operators are limited because data entry techniques are becoming more specialized. However, promotion to a supervisory position is possible after several years on the job. With additional training, often including community or junior college study, a few data entry and peripheral equipment operators advance to jobs as computer operators.

Computer operators also may be promoted to supervisory positions, or to jobs that combine supervision and computer operation. Through on-the-job experience and additional training, some computer operators advance to jobs as programmers.

Job Outlook

Changes in data processing technology will have differing effects on computer operating occupations. Employment of computer and peripheral equipment operators, for example, is expected to rise much faster than the average for all occupations through the mid-1990's. Employment of data entry operators, on the other hand, is expected to decline.

Recent advances in miniaturizing circuits have enabled manufacturers to reduce both the size and the cost of computer components. As



The operator communicates with the computer by entering instructions on a console.

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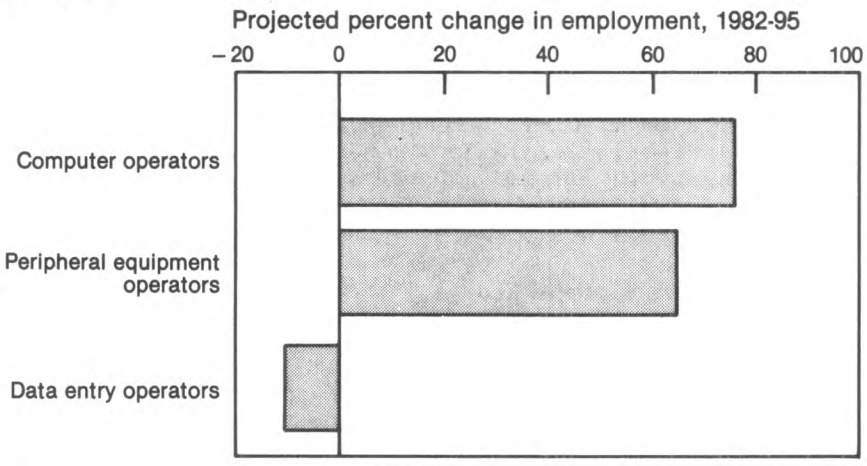
Technological advances will increase the demand for computer and peripheral equipment operators but lessen the need for data entry operators.



SOURCE: Bureau of Labor Statistics

this technology develops, a continued expansion in the use of computers is expected, increasing the need for computer and peripheral equipment operators. In addition to jobs resulting from employment growth, many openings will arise from the need to replace computer and peripheral equipment operators who transfer to other occupations or leave the labor force.

Improvements to data processing technology will reduce demand for data entry operators. The primary reason for this decline is the increased use of direct data entry by on-site computer terminals, optical scanners, and other devices. Despite the anticipated decline in employment, many openings, including part-time openings, will occur each year due to the need to replace workers who transfer to other occupations, retire, or die.

Earnings

In 1982, median weekly earnings of full-time computer operating personnel were $285 for computer and peripheral equipment operators and $240 for data entry operators. The middle 50 percent earned between $220 and $380 and between $205 and $300, respectively. The lowest 10 percent of computer and peripheral equipment operators earned $180 or less a week, and the top 10 percent earned more than $485. The bottom 10 percent of data entry operators earned less than $170 while the top 10 percent earned more than $390 weekly.

Weekly earnings of data entry operator trainees in private industry averaged around $220 in 1982, according to surveys conducted in urban areas by the Bureau of Labor Statistics and firms engaged in research on data processing occupations. Lead operators earned from $250 to $270 weekly.

Weekly earnings of beginning computer operators averaged about $230. Experienced workers earned from $270 to $300, and lead operators earned from $350 to $450 weekly.

Computer operators and data entry operators had higher earnings in the North and West than in the South. Operators employed in manufacturing, transportation and public utilities, and wholesale trade had higher earnings than those employed in retail trade, banking, insurance, and services.

In the Federal Government, computer operators and data entry operators without work experience started at about $205 a week in early 1982.

Related Occupations

Other occupations in which workers organize data and process information on electronic equipment include secretaries and typists, printing typesetters and compositors, transcribing machine operators, and file clerks.

Sources of Additional Information

People who want further information about work opportunities in computer operations should contact firms that use computers such as banks, manufacturing and insurance firms, colleges and universities, and data processing service organizations. The local office of the State employment services is another source of information about employment and training opportunities.

Mail Carriers and Postal Clerks

(D.O.T. 209.687-014; 230.363-010, .367-010; 239.367-018; and 243.367-014)

Nature of the Work

The United States Postal Service employs approximately 670,000 workers to move the Nation's mail. About four-fifths of them are mail carriers or postal clerks.

Most mail carriers travel planned routes delivering and collecting mail. Carriers start work at the post office early in the morning, where they spend a few hours arranging their mail for delivery and taking care of other details.

A carrier may cover the route on foot, by vehicle, or a combination of both. On foot, carriers carry a heavy load of mail in a satchel or push it in a cart. In some areas, they use a car or small truck. Residential carriers cover their routes only once a day, but some carriers assigned to a business district may make two trips a day. Deliveries are made house-to-house, to roadside mailboxes, and to large buildings, such as offices or apartments, which generally have all the mailboxes on the first floor.

Besides delivering and collecting mail, carriers collect money for postage-due and c.o.d. (cash on delivery) fees and obtain signed receipts for registered, certified, and insured mail. If a customer is not home, the carrier leaves a notice that tells where special mail is being held.

After completing their routes, carriers return to the post office with mail gathered from street collection boxes, homes, and businesses. They turn in the mail receipts and money collected during the day and may separate letters and parcels for further processing by clerks.

Many city carriers have more specialized duties. Some deliver only parcel post while others collect mail from street boxes and receiving boxes in office buildings. In contrast, rural carriers provide a wide variety of postal services. In addition to delivering and picking up mail, they sell stamps and money orders and accept parcels, letters, and items to be registered, certified, or insured.

All carriers answer customers' questions about postal regulations and services and provide change-of-address cards and other postal forms when requested.

Most people are familiar with the post office window clerk behind the counter who sells stamps and accepts parcel post. However, most postal clerks are distribution clerks who sort incoming and outgoing mail in workrooms out of public view.

Postal clerks work at local post offices or at large central mail processing facilities. Those at local post offices sort local mail for delivery to individual customers. Incoming mail collected from local collection boxes is forwarded to the nearest mail processing center. There, clerks sort and prepare the mail for delivery.

About 425 mail processing centers throughout the country service post offices in surrounding areas. There, mailhandlers unload the sacks of incoming mail and separate it into groups of letters, parcel post, magazines, and newspapers. They feed letters through stamp-canceling machines, then take the mail to other workrooms to be sorted by postal clerks according to destination. There, clerks operating electronic letter sorting machines push keys corresponding to the ZIP code of the local post office to which each letter will be delivered; the machine drops letters into proper slots. Other clerks sort odd-sized letters, magazines, and newspapers by hand. Finally, the mail is sent to local post offices for further sorting according to delivery route.

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In addition to selling stamps and money orders, clerks at post office windows weigh packages to determine postage and check to see if their condition is satisfactory for mailing. Clerks also register, certify, and insure mail and answer questions about postage rates, mailing restrictions, and other postal matters. Occasionally they may help a customer file a claim for a damaged package.

Working Conditions

Most carriers begin work early in the morning, in some cases as early as 4 a.m. if they have routes in the business district. Carriers spend most of their time outdoors, and deliver mail in all kinds of weather. Even those who drive often must walk when making deliveries and must lift heavy sacks of parcel post when loading their vehicles.

A carrier's schedule has its advantages: Carriers who begin work early in the morning are through by early afternoon, and they spend most of the day on their own, relatively free from direct supervision.

Working conditions of clerks vary according to work assignments and type of laborsaving machinery available. In small post offices, clerks may use a hand truck to move heavy mail sacks from one part of the building to another and sort mail by hand. In large post offices and mail processing centers, chutes and conveyors move the mail, and much of the sorting is done with machines. When not operating a letter sorting machine, clerks usually are on their feet, reaching for sacks and trays of mail and placing packages and bundles into sacks and trays.

Distribution clerks may become bored with the routine of sorting mail unless they try to improve their speed and accuracy. They also may have to work at night or on weekends, because most large post offices process mail around the clock.

A window clerk, on the other hand, has a greater variety of duties, frequent contact with the public, and a generally less strenuous job. Window clerks rarely have to work at night.

Employment

The U.S. Postal Service employed about 234,000 mail carriers and 307,000 postal clerks in 1982. Three-quarters of them worked full time. Although most mail carriers worked in cities and suburban communities, about 60,000 were rural carriers. Most postal clerks work at mail processing centers, although some sort mail and provide window service at local post offices throughout the country.

Training, Other Qualifications, and Advancement

Mail carriers and postal clerks must be U.S. citizens or have been granted permanent resident-alien status in the United States. They must be at least 18 years old (or 16, if they have a high school diploma). They must qualify on a written examination that measures speed and accuracy at checking names and numbers and ability to memorize mail distribution procedures. Applicants must pass a physical examination and may be asked to show that they can lift and handle mail sacks weighing up to 70 pounds. Applicants for mail carrier positions must have a driver's license, a good driving record, and pass a road test. Those applying for jobs as postal clerks operating an electronic sorting machine must pass a special examination which includes a machine aptitude test.

Applicants should apply at the post office or mail processing center where they wish to work to determine when an exam will be given. Applicants' names are listed in order of their examination scores. Five points are added to the score of an honorably discharged veteran, and 10 points to the score of a veteran wounded in combat or disabled. When a vacancy occurs, the appointing officer chooses one of the top three applicants; the rest of the names remain on the list to be considered for future openings until their eligibility expires, usually 2 years from the examination date.

Relatively few people under the age of 25 are hired as career mail carriers or postal clerks, a result of keen competition for these jobs and the customary waiting period of 1-2 years or more after passing the examination. It is not surprising, therefore, that most entrants transfer from other occupations.

Mail carriers and postal clerks are classified as casual, part-time flexible, part-time regular, or full time. Casual workers are not career employees, but are hired to help process and deliver mail during peak mailing or vacation periods of the year. Part-time flexible workers are career employees who do not have a regular work schedule, but replace absent workers and help with extra work as the need arises. Part-time regulars have a set work schedule of less than 8 hours a day. Full-time mail carriers usually work a 40-hour week over 5 or 6 days, but may work additional overtime hours when required. Full-time postal clerks usually work a 40-hour week over 5 days.

New mail carriers are trained on the job. They may begin as part-time flexible city carriers and become regular or full-time carriers in order of seniority as vacancies occur. Carriers can look forward to obtaining preferred routes as their seniority increases, or higher level jobs such as carrier technician, or promotion to supervisory positions.

New postal clerks also are trained on the job. Most clerks begin with simple tasks to learn regional groupings of States, cities, and ZIP codes. To help clerks learn these groups, many post offices offer classroom instruction.

A good memory, good coordination, and the ability to read rapidly and accurately are important. Distribution clerks work closely with other clerks, frequently under the tension and strain of meeting deadlines. Window clerks must be courteous and tactful when dealing with the public, especially when answering questions or receiving complaints.

Most clerks begin as part-time flexible employees and become full-time workers in order of seniority as vacancies occur. Full-time clerks may bid for preferred assignments such as the day shift, a window job, or a higher level nonsupervisory position as expediter or window service technician. Clerks also may advance to supervisory positions.

Job Outlook

In recent years, the number of applicants for mail carrier and postal clerk positions has greatly exceeded the number of openings. This situation is expected to continue, and persons seeking jobs in the Postal Service should anticipate keen competition.

Conflicting factors will influence the employment of mail carriers through the

Mail carriers must work in all types of weather.

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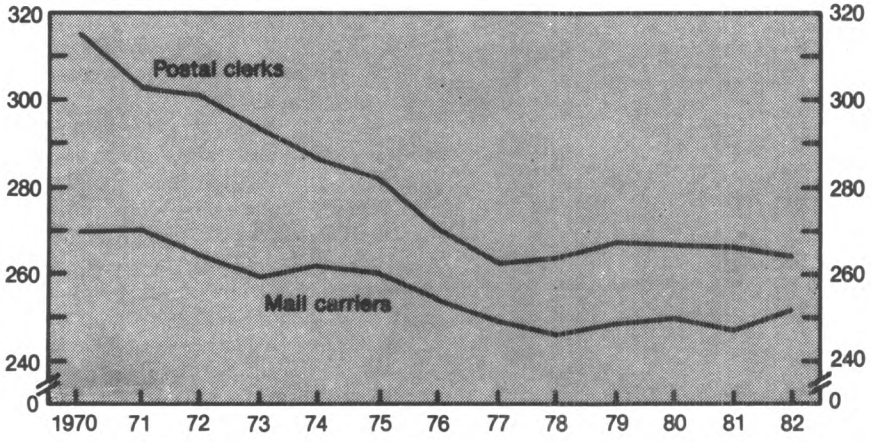
Technological improvements have eliminated the jobs of many postal workers.



SOURCE: U.S. Postal Service

mid-1990's. On the one hand, despite competition from alternative delivery systems and new forms of electronic communication, the volume of mail handled by the Postal Service is expected to continue to grow, third class mail from businesses to households in particular. A growing population—and the even more rapidly growing number of households—will stimulate demand for mail deliveries. On the other hand, with the full implementation of the "ZIP + 4" routing program, mail carriers will spend less time sorting their mail before delivering it. In addition, the Postal Service is moving towards more centralized mail delivery, such as utilizing more cluster boxes, to cut down on the number of door-to-door deliveries. These trends are expected to have an offsetting effect, and employment of mail carriers is expected to remain stable.

Employment of postal clerks is expected to decline through the mid-1990's. In spite of the anticipated increase in the total volume of mail, automation will continue to raise postal clerks' productivity, and fewer will be needed. Postal clerks who sort the mail will be affected most. Automation in the Postal Service encompasses such things as the further implementation of computer forwarding, presorting programs, and the "ZIP + 4" routing program, as well as the installation of optical character readers, bar code sorters, and flat-sorting machines that mechanically process large envelopes, magazines, and circulars. These and other technological advances have already eliminated thousands of postal jobs, as shown in the accompanying chart. Little change is expected in the number of postal clerks who work at post office windows, although their productivity should increase as more electronic scales are installed for their use. In addition, the proliferation of self-service stamp machines may tend to hold down the number of customers normally served by postal clerks.

Even though employment is not expected to increase, some jobs will be available because of the need to replace mail carriers and postal clerks who retire or stop working for other reasons. The factors that make entry to these occupations highly competitive—attractive salaries, a good pension plan, steady work, and modest educational requirements—contribute to a high degree of job attachment, so that replacement needs produce fewer job openings than in most other occupations. In contrast to the typical pattern, postal workers generally remain in their jobs until they retire; relatively few transfer to other occupations.

Although the volume of mail to be processed and delivered rises and falls with the level of business activity, as well as with the season of the year, full-time mail carriers and postal clerks have never been laid off. When mail volume is high, full-time carriers and clerks work overtime, part-time carriers and clerks work additional hours, and casual carriers and clerks may be hired. When mail volume is low, overtime is curtailed, part-timers work fewer hours, and casual workers are discharged. The projected long-term employment decline of postal clerks probably will not cause layoffs of permanent workers, but will be achieved by elimination of some positions vacated by workers who leave voluntarily, as was the case during the 1970's.

Earnings

In late 1982, experienced full-time city delivery mail carriers earned an average salary of $21,591 a year, about one and one-half times as much as average earnings for all nonsupervisory workers in private industry, except farming. For full-time carriers and postal clerks, base pay for beginners was $20,130 a year, rising to a maximum of $22,792 after 8 years. A 10-percent supplement is paid for hours worked between 6 p.m. and 6 a.m. Carriers and postal clerks working part-time flexible schedules began at $9.95 an hour in late 1982, with periodic increases up to $11.28 an hour after 8 years.

Rural delivery carriers had average base salaries of $21,736 in late 1982. Their earnings are determined through an evaluation of the amount of work required to service their routes. Carriers with heavier workloads generally earned more than those with lighter workloads. Rural carriers also received a maintenance allowance when required to use their own vehicles.

Most mail carriers and postal clerks belong to one of the four unions organizing postal workers: American Postal Workers Union, National Association of Letter Carriers, National Post Office Mail Handlers, and National Rural Letter Carriers Association.

Related Occupations

Mail carriers, mailhandlers, and postal clerks play an important role in moving the Nation's mail, and their work and qualifications are closely related. Other occupations with duties related to those of mail carrier include messengers, merchandise deliverers, delivery-route truckdrivers, newspaper delivery drivers, and newspaper carriers. Other occupations whose duties are related to those of postal clerk include mail clerks, file clerks, routing clerks, sorters, medical record clerks, clerk-typists, cashiers, keypunch operators, and ticket sellers.

Sources of Additional Information

Local post offices and State employment service offices can supply details about entrance examinations and specific employment opportunities for mail carriers and postal clerks.

Receptionists

(D.O.T. 205.367-038, 237.367-010 and -038)

Nature of the Work

All organizations want to make a good first impression on the public. This is an important part of the job of the receptionist, who generally is the first person a caller sees.

Receptionists greet customers and other visitors, determine their needs, and refer callers to the person who can help them. Receptionists' day-to-day duties vary a great deal, depending on where they work. Those in hospitals and doctors' offices, for example, may obtain personal and financial information and then direct patients to the proper waiting rooms. In beauty shops, receptionists arrange appointments and may show customers to the operator's booth. In factories or large business firms, they provide identification cards and arrange for escorts to take callers to the proper office.

Many receptionists keep records of callers, the times at which they called, and the persons to whom they were referred. When they are not busy with callers, receptionists may type, file, or operate a switchboard. Some receptionists open and sort mail and collect and distribute messages. Still others prepare travel vouchers and do simple bookkeeping.

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Receptionists may handle a variety of clerical duties.

Working Conditions

Because receptionists greet customers and visitors, they usually work in areas that are carefully designed and furnished to make a good impression. Working conditions usually are pleasant; offices are clean, well lighted, and relatively quiet.

Although most have regular hours, receptionists in hospitals and some professional offices may work weekends or in the evenings. Some receptionists work part time.

Employment

Receptionists held about 594,000 jobs in 1982. Although receptionists work in almost every kind of organization, about one-third of all jobs are located in doctors' and dentists' offices, hospitals, nursing homes, and other health service facilities. Factories, wholesale and retail stores, real estate offices, and firms providing a wide range of business and personal services also employ large numbers of receptionists.

Training, Other Qualifications, and Advancement

Many receptionist jobs are entry level and do not require office or business experience. The occupation accordingly attracts people outside the labor force, including homemakers and recent high school and college graduates. Employers usually require a high school diploma.

Personal characteristics are very important in this occupation. A receptionist should like meeting new people and have a desire to be helpful and informative. A neat appearance, a pleasant voice, and an even disposition also are important. Because receptionists do not work under close supervision, common sense and a thorough understanding of how the business is organized help them handle various situations that arise.

Promotion opportunities for receptionists are limited, especially in small offices. In large workplaces, however, a receptionist who has clerical skills may advance to a better paying job as a secretary, administrative assistant, or bookkeeper.

English, typing, shorthand, business arithmetic, basic accounting and bookkeeping, office procedures, and other useful subjects for receptionists are taught in high schools throughout the country. College or business school training also can be helpful in advancing to better paying office jobs. Many companies have their own training programs so that the skills needed for advancement can be learned on the job.

Job Outlook

Employment of receptionists is expected to grow faster than the average for all occupations through the mid-1990's. Although many openings are expected to occur each year as businesses expand, most job openings for receptionists will result from the need to replace experienced workers who transfer to other jobs, stop working for personal reasons, or retire. As in the past, replacement needs will create an exceptionally large number of job openings, for the occupation is large and turnover is higher than average.

Employment of receptionists is expected to grow more rapidly than employment of all clerical workers combined. This is largely because so many receptionists work for firms providing business and professional services—sectors of the economy that are expected to continue to show strong growth—particularly doctors' and dentists' offices, hospitals, and other health service facilities. In addition, more and more firms are beginning to recognize the importance of the receptionist in promoting good public relations. Because the receptionist's work is of a person-to-person nature, it is unlikely to be affected by office automation.

Since many receptionists also perform secretarial duties, persons with good typing, stenographic, and other skills should have the best job prospects.

Earnings

Full-time switchboard operator-receptionists working in urban areas averaged $11,362 a year in 1982, compared with an average of $13,880 a year for all nonsupervisory and production workers in private industry, except farming. Receptionists working in the West had the highest average annual earnings, $11,934, while those in the South had the lowest, $10,790. A 1982 survey of Federal, State, and local government workers conducted by the International Personnel Management Association showed that beginning telephone operator-receptionists averaged $10,332 per year, while those with experience averaged $12,876. According to the Administrative Management Society's 1982 survey of workers in both the public and private sectors, switchboard operator-receptionists earned $11,648 a year, on the average. In the Federal Government, beginning information receptionists with a high school diploma or 6 months of work experience earned about $9,800 a year in 1982. Average salaries for receptionists employed by the Federal Government were around $12,800 a year in 1982.

Related Occupations

A number of other workers deal with the public, receive and provide information, or direct people to others who can assist them. Among these are information clerks, information and referral aides, and customer service representatives.

Sources of Additional Information

State employment service offices can provide information about earnings, hours, and employment opportunities in this and other clerical jobs.

Reservation Agents and Transportation Ticket Clerks

(D.O.T. 237.267-010; 238.167-014, .367-010, -014, -018, and -026; and 248.382-010)

Nature of the Work

The manner in which a company's employees deal with the public, and the quality of the service they provide, often make the difference between a satisfied customer and a dissatisfied one. In transportation companies, reservation agents and transportation ticket clerks provide this important personal contact.

Reservation agents and transportation ticket clerks are employed by airline, railroad, bus, and steamship companies, automobile clubs, hotels, government agencies, and business firms to facilitate passenger travel in a variety of ways. They help passengers plan their trips by answering questions and offering suggestions on travel arrangements such as routes, time schedules, rates, and types of accommodation. They make and confirm reservations, calculate expenses, and write and sell tickets. When passengers are about to embark on their trips, these agents and clerks check their baggage, direct them to the point of departure, and help them to board.

Airlines employ reservation agents, gate agents, and ticketing clerks. Airline reservation agents work in large central offices answering customer telephone inquiries and booking reservations. Each agent has access to a computer terminal and, by typing instructions on the keyboard, can quickly obtain the necessary information and make the reservations. Agents also can change or cancel reservations at the customer's request, simply by modifying the record on the computer. Airline ticketing clerks compile and record information to assemble airline tickets which then are sent to passengers. Airline gate agents work in airports and assist passengers to board the correct airplane. Their duties include checking flight tickets, directing passengers to the right boarding area, allowing passengers to board the airplane, and assisting elderly, disabled, or young passengers to board or depart from the airplane.

Airlines, as well as railroad, bus, and steamship companies, also employ ticket agents (sometimes referred to by other titles, such as passenger agent, passenger-booking clerk, reservation clerk, ticket clerk, and ticket seller). In addition to selling tickets, these workers answer inquiries, plan routes, ensure passenger seating, check baggage, and sell travel insurance.

Railroads employ reservation clerks to handle customers' requests for passenger space on

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trains. They assign space after consulting the chart diagram of each car, and then make the proper arrangements with other company employees to ensure that passengers can complete their trips smoothly.

Passenger rate clerks work for bus companies. They arrange charter trips by providing fares to customers, planning travel routes, computing rates, and keeping customers informed of appropriate details. They may also arrange travel accommodations for tourists.

Automobile clubs have travel counselors and information clerks who plan trips for club members. Using a road map, they show the best route from the point of origin to the destination, as well as the return. They indicate the points of interest, restaurants, hotels, or other housing accommodations along the route, as well as explain what emergency repair services are available during the trip. They may make reservations for club members and calculate their expenses and mileage.

Working Conditions

Because the transportation industry operates at all hours, reservation agents and transportation ticket clerks may have irregular schedules. Agents and clerks with the least seniority often work nights and weekends. Reservation agents in central offices making reservations by telephone generally sit while on duty. Ticket clerks in transportation terminals dealing face-to-face with passengers, however, usually stand most of the time. In contrast to most other clerical occupations, there is little part-time work in these jobs.

During holidays and other busy periods, agents and clerks may find the work hectic due to the large number of passengers who must be accommodated rapidly. When operations are interrupted, such as when weather conditions lead to delays or rerouting of airplane flights, agents and clerks serve as buffers between the companies and their customers. Trying to pacify irate passengers under these conditions can be very difficult.

Employment

Reservation agents and transportation ticket clerks held about 108,000 jobs in 1982. Airlines employed nearly 50,000 reservation agents and 38,000 ticket clerks. Railroad companies had about 7,000 reservation clerks and 10,000 ticket clerks. Bus companies employed almost 4,000 ticket clerks; automobile clubs, approximately 8,500 travel counselors and information clerks. Water transportation companies employed about 500 ticket clerks. Most agents and clerks worked in downtown ticket and reservation offices and at large metropolitan transportation terminals where most passenger business originates. Some were employed in smaller communities served by transportation companies.

Training, Other Qualifications, and Advancement

Hiring requirements vary from company to company within the transportation industry. High school graduation generally is required and often some college is preferred. In fact, compared to other clerical occupations, a higher-than-average percentage of persons entering these occupations have attended college. While the airline industry has traditionally drawn jobseekers who have had some college, passenger service jobs throughout the transportation industry are being sought more often by college graduates as competition closes off other job opportunities.

Previous experience dealing with the public, prior employment in the transportation industry, or both, may pave the way to a passenger service job. Survey data show that the majority of openings are filled by persons in their twenties or thirties, many of whom transfer from other occupations. Because reservation agents and transportation ticket clerks must deal directly with the public, a good appearance and a pleasant personality are important, as are problem-solving ability and good interpersonal skills. A good speaking voice is essential because these employees frequently use the telephone or public address system. Courses useful to persons wanting to enter these occupations include basic math and English, geography, U.S. history, and public speaking. Typing ability often is needed and experience with word processing equipment and computers may be useful.

Orientation and training for new reservation agents and transportation ticket clerks vary with the company. In some cases, formal instruction is given, whereas in other cases, all the training is given on the job. In airlines, for example, new reservation agents receive about a month of classroom instruction. They are taught company policy and government regulations that cover ticketing procedures and other matters related to the airline. They learn to read schedules, calculate fares, and plan passenger itineraries. They also are taught to use the computer to obtain information on schedules and seat availability, and to reserve space for passengers. They are tested daily and homework usually is assigned. To maximize their productivity, reservation agents are expected to minimize the time spent on each call without, of course, alienating customers. It takes practice to cut off garrulous callers without offending them. Thus, learning how to carry on conversations in an organized, yet pleasing manner is an important part of their training. After completing classroom instruction, new agents work under supervisors or experienced agents for several weeks. On the other hand, automobile clubs train their travel counselors on the job, without formal classes.

Advancement opportunities are limited. Some reservation agents and transportation ticket clerks are promoted to supervisory positions, and a small number eventually become field sales agents or city and district sales managers. In unionized establishments, entry-level positions may be the only ones open to individuals outside the firm; higher level positions are generally filled through promotion from the ranks of company employees.

Job Outlook

Little change in employment of reservation agents and transportation ticket clerks is expected through the mid-1990's, for automation and other productivity improvements will enable the transportation industry to handle more passengers without substantially increasing the number of agents and clerks. Most job openings will arise as experienced agents and clerks transfer to other jobs or leave the labor force.

Reservation agents rely on computer terminals for information on airline schedules.

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Applicants are likely to encounter considerable competition for openings, for the supply of qualified applicants far outstrips demand. For one thing, entry requirements are not restrictive. Moreover, airline jobs in particular attract many applicants because of the travel benefits and the glamour associated with the industry.

Employment of reservation agents and transportation ticket clerks is sensitive to cyclical swings in the economy. Some agents and clerks are likely to be laid off or demoted during recessions, when demand for passenger travel declines and few new agents and clerks are hired.

Earnings

According to a Bureau of Labor Statistics survey of the airline industry, reservation agents earned average weekly salaries of $445 in 1982, while gate agents averaged $492 and ticket agents, $497. AMTRAK paid reservation clerks between $8.39 and $9.44 an hour in 1982, and ticket clerks received $8.96 to $10.08. According to a union contract, a major bus company in 1982 paid its telephone information clerks hourly rates ranging from $8.12 to $8.74, while ticket agents were paid from $8.16 to $9.35. In 1982, travel counselors working for a national automobile club earned starting salaries of $162 to $179 a week; after a few years' experience, travel counselors averaged between $202 and $221, with a top salary of $296. Fringe benefits for agents and clerks often include discounts on travel on their company's carriers for themselves and their immediate families.

Many agents and clerks belong to labor unions. Five unions cover most of the organized agents and clerks: The Air Line Employees Association; the Amalgamated Transit Union; the Brotherhood of Railway, Airline and Steamship Clerks, Freight Handlers, Express and Station Employes; the International Brotherhood of Teamsters, Chaffeurs, Warehousemen and Helpers of America; and the Transport Workers Union of America.

Related Occupations

Other workers who must be friendly and pleasant while providing information or assisting people include ground hosts/hostesses (air transportation), appointment clerks, information clerks, and receptionists.

Sources of Additional Information

Information about jobs in a particular transportation company may be obtained by writing to the personnel manager of the company. Addresses of airlines are available from:

Air Transport Association of America, 1709 New York Ave. NW., Washington, D.C. 20006.

Secretaries and Stenographers

(D.O.T. 201.162-010, .362-010, -014, -018, -022, and -030; 202.362-010, -014, -018, and -022)

Nature of the Work

The efficiency of any organization depends in part upon *secretaries* and *stenographers*, who are at the center of communications within the firm. They process and transmit information to the staff and to other organizations.

Secretaries perform a variety of administrative and clerical duties so that their employers can work on other matters. They schedule appointments, give information to callers, organize and maintain files, fill out forms, and take and transcribe dictation. The amount of time secretaries spend on these and other duties—including typing—depends on the way office work is handled within the organization.

In offices that have word processing centers, *administrative secretaries* handle everything except dictation and typing. Their duties range from filing, routing mail, and answering telephones to more complex work such as answering letters, doing research, and preparing statistical reports. Administrative secretaries often work in clusters of three or four so that they can help each other. Because they are released from dictation and typing, they can serve several members of the professional staff.

Some secretaries do highly specialized work for which training is available in business schools and colleges as well as community colleges. *Legal secretaries* (D.O.T. 201.362-010) prepare legal papers and correspondence such as summonses, complaints, motions, and subpoenas. They may also review law journals and assist in other ways with legal research. *Medical secretaries* (D.O.T. 201.362-014) transcribe dictation, prepare correspondence, and assist physicians or medical scientists with reports, speeches, articles, and conference proceedings. They need to know medical terminology and be familiar with hospital or laboratory procedures. *Technical secretaries* assist engineers or scientists. In addition to the usual secretarial duties, they may prepare much of the correspondence, maintain the technical library, and gather and edit materials for scientific papers.

Another specialized secretary is the *social secretary* (D.O.T. 201.162-010), who arranges social functions, answers personal correspondence, and keeps the employer informed about all social activities. *Membership secretaries* (D.O.T. 201.362-018) compile and maintain membership lists, record the receipt of dues and contributions, and give out information to members of organizations and associations. They may have such other duties as sending out newsletters and promotional materials. *School secretaries* (D.O.T. 201.362-022) handle secretarial duties in elementary and secondary schools; they may take care of correspondence, prepare bulletins and reports, keep track of money for school supplies and student activities, and maintain a calendar of school events.

Stenographers (D.O.T. 202.362-014) and *stenotype operators* (D.O.T. 202.362-022) take dictation and then transcribe their notes on a typewriter. They may either take shorthand or use a stenotype machine that prints symbols as certain keys are pressed. *General stenographers*, including most beginners, take routine dictation and do other office tasks such as typing, filing, answering telephones, and operating office machines. Experienced and highly skilled stenographers take difficult dictation and do more responsible clerical work. They may sit in on staff meetings and later give a summary report or a word-for-word record of the proceedings. They also supervise other stenographers, typists, and clerical workers. *Technical stenographers* must know the terms used in a particular profession. They include medical, legal, and engineering or scientific stenographers. Some experienced stenographers take dictation in foreign languages; others work as public stenographers serving traveling business people and others.

Men hold a small but growing number of secretarial jobs.

Shorthand reporters (D.O.T. 202.362-010) are specialized stenographers who record all statements made in a proceeding. Shorthand reporters often work as *court reporters*. They take down all statements made at legal proceedings and present their record as the official transcript. Many other shorthand reporters work as *freelance reporters* who record out-of-court testimony for attorneys, proceedings of meetings and conventions, and other private activities. Still others record the proceedings in the U.S. Congress, in State legislatures, and in State and Federal agencies. Many reporters dictate notes on magnetic tapes that a typist can transcribe later. Many other reporters transcribe their notes with the help of note readers, persons skilled in reading back shorthand notes. A growing number of reporters use Computer Aided Transcription (CAT), a system in which a computer directly translates the reporter's shorthand notes into English. Because the reporter's transcript is the official record of a proceeding, accuracy is vitally important.

Print shop stenographers (D.O.T. 202.362-018) take dictation and use typewriters to transcribe the dictated material and to prepare metal printing plates to be used by addressing machines.

Working Conditions

Secretaries usually work in offices that are clean, well lighted, and free from high noise levels except during peak typing periods. Their jobs often involve sitting for long periods, and typing often requires working from materials that are difficult to read. Executive secretaries,

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who perform a number of duties, have the variety in their jobs that many people prefer.

Secretaries and stenographers generally work a standard 40-hour week. In some cities, especially in the Northeast, the scheduled workweek is 37 hours or less.

Office work lends itself to alternative or flexible working arrangements, and many secretaries hold part-time or temporary jobs. Some participate in job-sharing arrangements, in which two people divide responsibility for a single job. A few employers are experimenting with "home based" offices; sophisticated equipment installed in secretaries' homes enables them to transcribe material at home and, almost instantly, produce printed copy in an office miles away.

Employment

Secretaries held about 2,441,000 jobs in 1982, making this one of the largest occupations in the U.S. economy. Stenographers held approximately 270,000 jobs.

Secretaries are employed in organizations of every description. They work for businesses that engage in manufacturing, mining, construction, wholesale and retail trade, transportation, and communications. Banks, insurance companies, investment firms, and real estate firms are important employers, too. Secretaries work in Federal, State, and local government agencies. About half of them, however, are employed by organizations that provide services: Educational institutions, hospitals and other health facilities, law firms, membership organizations, and companies that provide business services. Among the latter are employment agencies that provide "office temporaries" and word processing service bureaus.

Stenographers, too, are employed throughout the economy. Almost a third, however, work for government agencies, a reflection of the large number of shorthand reporters working in courts, legislatures, and agencies in the executive branch.

Training, Other Qualifications, and Advancement

High school graduates qualify for most secretarial positions provided they have basic office skills. Secretaries must be proficient in typing and good at spelling, punctuation, grammar, and oral communication. Shorthand is necessary for some positions. Word processing experience is increasingly important and some employers require it. Others, however, provide word processing instruction to newly hired workers.

The skills needed for a secretarial job can be acquired in various ways. Although formal training or refresher courses are not essential for most jobs, training is an asset and may lead to higher paying jobs. Secretarial training ranges from high school vocational education programs that teach office practices, shorthand, and typing to 1- to 2-year programs in secretarial science offered by business schools, vocational-technical institutes, and community colleges.

In addition to a solid grounding in secretarial skills, employers look for a good command of the English language and an aptitude for numbers. Some firms look for individuals with excellent interpersonal skills, since secretaries must be tactful in their dealings with many different people. Discretion, judgment, organizational ability, and initiative are important for the more responsible secretarial positions.

Continuing changes in the office environment, many made possible by the computer, have increased the demand for secretaries and stenographers who are adaptable and versatile. Workers must be prepared to be retrained whenever an employer introduces new equipment. Secretaries may have to attend classes to learn to operate word processing equipment, information storage systems, and other automated equipment. The frequency with which office equipment is changed or updated makes retraining and continuing education an integral part of the job, and employers seek workers who understand and accept the inevitability of change.

Employers usually have no preferences among the many different shorthand methods. For court reporters, however, the preference is for stenotype (machine shorthand), not only because reporters can write faster using stenotype, but also because they can feed stenotype notes to a computer for high-speed transcription. The most important factors in hiring and promotion are speed and accuracy. To qualify for jobs in the Federal Government, stenographers must be able to take dictation at a minimum of 80 words per minute and type at least 40 words per minute. Workers must achieve higher rates to advance to more responsible positions. In private firms, the requirements vary, but applicants with the best speed and accuracy will receive first consideration in hiring. Many shorthand reporting jobs require more than 225 words of dictation per minute; shorthand reporters in the Federal Government generally must take at least 175 words a minute.

Several States require each court reporter to be a Certified Shorthand Reporter (CSR). A certification test is administered by a board of examiners in each of the States that have CSR laws. The National Shorthand Reporters Association confers the designation Registered Professional Reporter (RPR) upon those who pass a two-part examination and participate in continuing education programs. The RPR designation is recognized as the mark of excellence in the profession.

Advancement for secretaries and stenographers generally comes about in one of two ways: Promotion to more responsible secretarial positions, or transfer to another kind of job. As secretaries gain experience, they can qualify for the designation Certified Professional Secretary (CPS) by passing a series of exams given by the Institute of Certifying Secretaries, a department of Professional Secretaries International. This designation is recognized by a growing number of employers as the mark of achievement in the secretarial field. Stenographers may advance to secretarial jobs; those who acquire the necessary speed through additional training can become shorthand reporters.

Qualified secretaries who broaden their knowledge of their company's operations may be promoted to positions such as administrative assistant, clerical or secretarial supervisor, and office manager. By taking college courses or completing a degree program in a field such as business, marketing, accounting, or personnel administration, secretaries may progress into entry level management positions.

Secretaries and stenographers with word processing experience can advance to jobs as word processing trainers, supervisors, or managers within their own firms or in a secretarial or word processing service bureau. They also can get jobs with manufacturers of word processing and other office equipment in positions such as instructor or sales representative.

Job Outlook

Employment of secretaries is expected to increase about as fast as the average for all occupations through the mid-1990's due to the steadily growing need to process information. Demand for secretaries will rise as new organizations are established and existing ones expand. Hospitals, nursing homes, and university medical centers; insurance companies offering new forms of protection; and banks providing financial services to a growing and increasingly affluent population are just a few of the organizations that will need more secretaries in the years ahead.

An exceptionally large number of jobs will be available through the mid-1990's due to expansion in employment and the need to replace experienced secretaries who leave the occupation. As in most other occupations, replacement needs will be the primary source of jobs.

The impact of office automation on employment of secretaries is a subject of intense scrutiny. However, experts disagree as to the timing and probable consequences of widespread application of new technologies. Nonetheless, developments in office technology are certain to continue, and they will bring about further changes in the secretary's work environment. One thing seems certain: Automated office equipment cannot substitute for those personal qualities that are essential to the job.

Highly qualified secretaries are in great demand, and this situation is expected to continue. Job prospects are excellent for secretaries with strong typing, shorthand, and word processing skills, and such personal qualities as organizational ability, good judgment, and initiative.

Opportunities are excellent for temporary or part-time work in the secretarial field. Employers are increasingly receptive to such arrangements because of the shortage of qualified secretaries in many parts of the country.

Employment of stenographers is expected to continue the decline of recent years. The widespread use of dictation machines has greatly reduced the need for office stenographers, and the traditional "steno pool" is becoming a thing of the past. In contrast, demand for skilled shorthand reporters should remain strong as State and Federal court systems expand to handle the rising number of criminal court cases and civil lawsuits. Competition for entry level

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jobs as shorthand reporters is increasing, as more students enter the field. Opportunities will be best for those who have earned certification by the National Shorthand Reporters Association.

Earnings

Secretaries and stenographers' salaries vary a great deal, usually reflecting differences in skill, experience, and level of responsibility.

Salaries in different parts of the country also vary; earnings generally are lowest in southern cities and highest in northern and western urban areas. In 1982, for example, secretaries averaged $16,016 a year in the Northeast, $16,848 in the North Central region, $17,784 in the West, and $15,548 in the South.

In addition, salaries vary by industry. Salaries of secretaries and stenographers tend to be highest in public utilities and manufacturing and lowest in finance, insurance, and real estate.

Stenographers in private industry averaged $16,307 a year in 1983; experienced stenographers averaged $19,367. Secretaries to supervisors in small offices averaged $14,732 a year in 1983. Secretaries to officers in small companies had an average yearly salary of $16,031; those working for middle management in large companies averaged $18,254. Secretaries holding greater responsibilities, such as executive secretaries to corporate officers, earned an average salary of $20,232 per year.

Beginning clerk-stenographers in the Federal Government earned from $10,645 to $13,369 a year in 1982 depending on education, training, and experience. Shorthand reporters generally earn higher salaries than stenographic office workers. Earnings vary, depending on speed, education, experience, and geographic location (earnings are generally higher in large cities than in rural areas).

Starting salaries for secretaries in the Federal Government ranged from $10,645 to $16,559 a year. Clerk-stenographers and secretaries employed by the Federal Government in 1982 had average annual salaries of about $13,300 and $16,000, respectively.

Employers usually pay secretaries and stenographers who have word processing experience higher salaries than those without such experience.

Most secretaries and stenographers in large cities receive 7 paid holidays or more a year and a 2-week vacation after working 1 year. With added years of service, vacations may range to 4 weeks or more. Group life and health insurance, pension plans, and other fringe benefits often are provided.

Related Occupations

A number of other workers type, record information, and process paperwork. Among these are bookkeepers, receptionists, office managers, personnel clerks, typists, administrative assistants, medical assistants, and legal assistants.

Sources of Additional Information

For career information, write to:

Professional Secretaries International, 2440 Pershing Rd., Suite G10, Kansas City, Mo. 64108.

High school students interested in careers as legal secretaries may request the pamphlet *So You Want To Be A Legal Secretary*. Write to:

National Association of Legal Secretaries (International), 3005 East Skelly Dr., Suite 120, Tulsa, Okla. 74105.

For information about shorthand reporting, contact:

National Shorthand Reporters Association, 118 Park St. SE., Vienna, Va. 22180.

Brochures describing a career as a secretary, legal secretary, or shorthand reporter are available upon request from the Association of Independent Colleges and Schools (AICS). AICS also issues an annual directory of accredited business schools that offer training in such fields as secretarial science, accounting, data processing, fashion merchandising, and travel. Contact:

Association of Independent Colleges and Schools, 1 Dupont Circle, NW., Suite 350, Washington, D.C. 20036.

State employment offices can provide information about job openings for secretaries and stenographers locally and nationwide.

Shipping and Receiving Clerks

(D.O.T. 209.367-042; 219.367-030; 222.367-010 and -066, .387-010, -014, -018, and -050, .567-010 and -014, .587-034, -038, and -058, .687-018, -030, and -034; 248.362-010 and .367-014; and 919.687-010)

Nature of the Work

Shipping and receiving clerks keep track of goods transferred between businesses and their customers and suppliers. In small companies, one clerk may record all shipments sent out and received; in larger companies, a number of clerks take care of this recordkeeping.

Shipping clerks are responsible for all shipments leaving a place of business. Before goods are sent to a customer, these clerks check to be sure the order has been filled correctly, or may fill the order themselves. They obtain merchandise from the stockroom and wrap it or pack it in shipping containers. Clerks also put addresses and other identifying information on packages, look up and compute either freight or postal rates, and record the weight and cost of each shipment. They also may prepare invoices and furnish information about shipments to another part of the company, such as the accounting department. Once a shipment is checked and ready to go, shipping clerks may move it to the shipping dock and direct its loading into trucks according to its destination. Shipping and receiving clerks in small businesses may perform some stock clerk duties.

When shipments arrive, receiving clerks perform tasks similar to those of shipping clerks. They determine whether their employer's orders have been correctly filled by verifying incoming shipments against the original order and the accompanying bill of lading or invoice. They record the shipment and the condition of its contents. Clerks also arrange for adjustments with shippers whenever merchandise is lost or damaged. The job may also include routing or moving shipments to the proper department, warehouse section, or stockroom and providing information that is needed to compute inventories.

Working Conditions

Although shipping and receiving clerks generally work in warehouses or in shipping and receiving rooms, they may spend considerable time on outside loading platforms. Workplaces often are large, unpartitioned areas that may be drafty, cold, and littered with packing materials.

Most clerks have to stand for long periods while they check merchandise. Locating numbers and descriptions on cartons often requires a great deal of bending, stooping, and stretching. Also, under the pressure of getting shipments moved on time, clerks sometimes may help load or unload materials in the warehouse.

Night work and overtime, including work on Saturdays, Sundays, and holidays, may be necessary when shipments have been unduly delayed or when materials are needed immediately on production lines. Shipping and receiving clerks receive time and one-half for work over 40 hours.

Employment

Shipping and receiving clerks held about 365,000 jobs in 1982. Nearly half were employed by wholesale houses or retail stores and over one-third worked in factories. About 1 in 10 worked part time. Although jobs for shipping and receiving clerks are found throughout the country, most clerks work in urban areas,

Shipping and receiving clerks must make sure that invoices correspond to shipments.

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where many factories and wholesale houses are located.

Training, Other Qualifications, and Advancement

High school graduation is usually required for beginning jobs in shipping and receiving departments. Business arithmetic, typing, and other high school business subjects are helpful. The ability to write legibly and keep orderly records is important. In general, jobseekers must demonstrate that they can master company procedures, including the use of automated equipment. With the rapidly growing use of computers for inventory control and other recordkeeping purposes, the job of shipping and receiving clerk is increasingly machine oriented.

Willingness to work at repetitive tasks, dependability, and an interest in learning about the firm's products and business activities are other qualities that employers seek.

New employees usually are trained on the job by an experienced worker. As part of their training, they often file, check addresses, attach labels, and check items included in shipments. As clerks gain experience, they may be assigned tasks requiring a good deal of independent judgment, such as handling problems with damaged merchandise, or supervising other workers in shipping or receiving rooms.

A job as a shipping or receiving clerk offers a good opportunity for new workers in a firm to learn about their company's products and business practices. Some clerks may be promoted to head shipping or receiving clerk, warehouse manager, or purchasing agent. Very experienced workers with a broad understanding of shipping and receiving may enter related fields such as industrial traffic management. (Purchasing agents are discussed elsewhere in the *Handbook*.)

Job Outlook

Employment of shipping and receiving clerks is expected to increase more slowly than the average for all occupations through the mid-1990's, in part because so many clerks work in manufacturing and wholesale trade, industry sectors that are growing more slowly than the overall economy.

Employment growth will continue to be affected by automation, as all but the smallest firms move to hold down labor costs by using computers to store and retrieve shipping and receiving records. The use of common carriers instead of company trucks to move shipments also will limit the need for shipping and receiving clerks.

Nevertheless, numerous job openings will occur every year as shipping and receiving clerks transfer to other jobs or leave the labor force. Because this is an entry level occupation, many vacancies are created by normal career progression.

While the amount of movement in and out of the occupation is about average for a clerical occupation, the reasons for that movement are atypical. Unlike office clerical workers, who tend to be women, the majority of shipping and receiving clerks are men. Thus, few clerks leave their jobs because of homemaking responsibilities, for example. Openings for shipping and receiving clerks generally occur because workers have taken other jobs.

Earnings

Median weekly earnings of full-time shipping and receiving clerks were about $260 in 1982; the middle 50 percent earned between $200 and $340 a week. Ten percent earned less than $160 and 10 percent more than $450.

Shipping and receiving clerks in urban areas averaged $302 a week in 1982, according to a recent survey. This was about as much as the average for all nonsupervisory workers in private industry, except farming. Salaries varied substantially, however, by type of employer. Shipping and receiving clerks employed by manufacturing firms averaged $301, those working for wholesale houses averaged $322, and those employed by public utilities averaged $345. In addition, shipping and receiving clerks working in the West tended to have the highest salaries, while those in the South had the lowest.

Related Occupations

Shipping and receiving clerks record, check, and often store the materials that a company receives. They also process and pack goods for shipment. Other workers who perform similar duties are stock clerks, material clerks, distributing clerks, routing clerks, and order fillers.

Sources of Additional Information

State employment service offices can provide information about job openings for shipping and receiving clerks.

Teacher Aides

(D.O.T. 099.327-010, 219.467-010 and 249.367-074)

Nature of the Work

Teacher aides handle routine activities to give teachers more time for teaching. They help and supervise students in the classroom, cafeteria, or school yard. They record grades, setup equipment, or help prepare materials for instruction.

Aides' responsibilities vary greatly by school district. In some, aides help with the instruction of children, under the supervision and guidance of teachers. They work with students individually or in small groups—listen to students read, help them find information for reports, and watch them demonstrate a skill. Sometimes, aides take charge of special projects and prepare equipment or exhibits for a science demonstration, for example.

In other districts, teacher aides primarily handle routine nonteaching tasks. They may grade tests and papers, check homework, and keep health and attendance records. Secretarial duties such as typing, filing, and duplicating materials for the teacher's use may be part of the aide's job. Sometimes, teacher aides stock supplies, operate audiovisual equipment, and keep classroom equipment in order. They also may supervise students during lunch and recreation periods and school bus loading.

Working Conditions

More than half of all teacher aides work part time (less than 35 hours a week). They may work inside or outdoors and may spend much of their time standing, walking, or kneeling. Working closely with the students can be both physically and emotionally tiring.

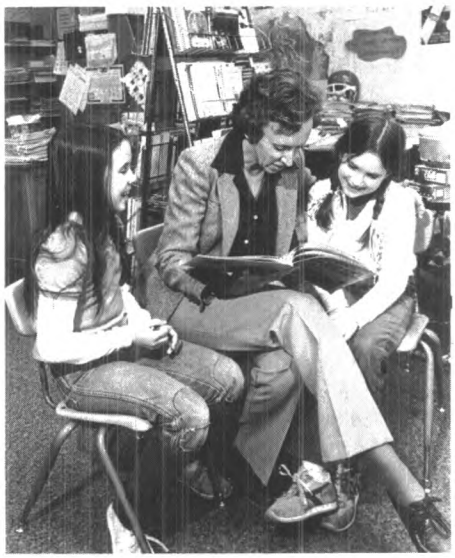
Employment

Teacher aides held 463,000 jobs in 1982. Although they are employed in both elementary and secondary schools, aides are concentrated in the early grades. A substantial number have been hired in recent years to assist special education teachers who work with physically, mentally, or emotionally handicapped children. Many aides work in large city schools or in suburban schools bordering major metropolitan areas. However, aides are also employed in small schools, notably in rural areas that find it difficult to retain enough qualified teachers. Many school systems also rely on the services of volunteers, who may perform the same duties as teacher aides.

Training, Other Qualifications, and Advancement

Educational requirements for teacher aides vary widely. Some school districts require a high school diploma; others do not. Still others require some college training. Districts that delegate a significant amount of classroom responsibility to aides usually require more training than those which primarily assign them clerical or monitor duties.

Teacher aides generally receive their training for classroom work on the job. However, a number of 2-year and community colleges offer associate degree programs that prepare graduates to work directly in the classroom as teacher aides.



Teacher aides work in the classroom under a teacher's supervision or grade papers and tests.

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Newly hired teacher aides undergo a period of orientation and training in which they learn how to help the classroom teacher. Aides are taught how to operate audiovisual equipment, administer first aid, and keep records. They learn to make charts and other instructional materials and to prepare bulletin boards and work with other art media. In addition, they are made familiar with the organization and operation of a school and the methods used to teach handwriting, reading, math, science, and other school subjects.

Personal traits are among the most important characteristics for the teacher aide's job. Aides should be able to work with children and to handle classroom situations with fairness and patience. Preference may be given in hiring to those with previous experience in working with children. Aides also must demonstrate initiative and a willingness to follow the classroom teacher's directions. They must have basic speech and writing skills and be able to communicate effectively with students and teachers. Clerical skills may be necessary also.

Thirteen States have certification procedures for teacher aides. To qualify, a teacher aide may need a high school diploma or general equivalency degree (G.E.D.), or even some college training. Kansas, Louisiana, Texas, and Wisconsin grant permits for paraprofessionals in the field of special education.

Many schools may have additional regulations regarding the hiring of teacher aides. For example, some school districts give preference to persons residing within the school district; some require that teacher aides pass a physical examination.

The local superintendent of schools and the State department of education can provide detailed information on employment requirements.

Advancement for teacher aides, usually in the form of higher earnings or increased responsibility, comes primarily with experience. Some school districts provide release time so that aides may take college courses. Aides who earn bachelor's degrees may become certified teachers.

Job Outlook

Employment of teacher aides is expected to increase about as fast as the average for all occupations through the mid-1990's. The projected increase in elementary school enrollments beginning in the mid-1980's and in secondary schools after 1990 is expected to increase the demand for aides. Enrollment growth will not occur at the same rate in all parts of the country, however. Largely because of migration to the South and West, enrollment increases are expected to be greater in those regions than in the Northeast and North Central States.

Teacher aide employment is highly sensitive to changes in State and local expenditures for education. Pressures from taxpayers to limit tax and spending increases are likely to continue. However, pressures on education budgets are far greater in some States and localities than in others. Moreover, school systems respond to budget constraints in different ways. Severe curtailment of educational spending would undoubtedly result in staff cutbacks in some school districts, while other districts might respond by hiring more teacher aides and fewer teachers. A number of teacher aide positions are financed through Federal programs; reductions in Federal funding would affect some districts more than others.

Because of relatively high turnover in the occupation, most openings for teacher aides are expected to occur as a result of the need to replace workers who transfer to other occupations, leave the labor force to assume full-time housekeeping responsiblities, return to school, or for other reasons.

Earnings

In 1982-83, teacher aides involved in teaching activities earned an average of about $5.30 an hour; those performing only nonteaching activities averaged about $5.00 an hour. Earnings varied by region and also by the work experience and academic qualifications of the aide. Many aides are covered by collective bargaining agreements and have health and pension benefits similar to those of the teachers in their schools.

Related Occupations

The educational support activities that teacher aides perform, demand organizational skills, cooperativeness, recordkeeping abilities, and a talent for getting along with people. Other occupations requiring some or all of these skills include childcare attendants, career guidance technicians, home health aides, library attendants, medical record technicians, nurse aides, receptionists, record custodians, and retail sales clerks.

Sources of Additional Information

Information on a wide range of education-related issues, including teacher aide unionization, can be obtained from:

American Federation of Teachers, 11 Dupont Circle, Washington, D.C. 20036.

Telephone Operators

(D.O.T. 235.222-010, .462-010, .562-014, .662-014, -018, -022, and -026; and 239.367-026)

Nature of the Work

Although millions of telephone numbers are dialed directly each day, making a call sometimes requires the assistance of a telephone operator. An operator may be needed because a caller wants to reverse long-distance charges, find out a telephone number in another city, or know the cost of a call. Operators also help contact the police or fire departments in an emergency or arrange conference calls for business executives.

Providing these services are two groups of telephone operators. The operators who work in telephone company central offices probably are the most familiar. But many businesses and large organizations receive so many calls that they employ operators to run their private branch exchange (PBX) switchboards. Sometimes operators place calls by inserting and removing plugs in switchboards and by listening and speaking into their headsets. However, many switchboards, especially those in telephone company central offices, are operated by pushbuttons.

Telephone company operators known as *central office operators* help customers with calls that require assistance, such as person-to-person, coin-station, and collect calls. They obtain the information needed to complete the call and record the details for billing. Those who make long-distance connections are called *long-distance operators*. *Directory assistance operators* look up and provide telephone numbers.

PBX operators, sometimes called PBX attendants or switchboard operators, run switchboards for business firms and other establishments. They connect interoffice or house calls, answer and relay outside calls, assist company employees in making outgoing calls, supply information to callers, and record charges. In small establishments, PBX operators may do other office work such as typing or sorting mail. Many act as receptionists or information clerks.

Qualified telephone company operators can become *private-branch-exchange service advisors*, sometimes called customer instructors or telephone usage counselors. They conduct training classes in the operation of switchboard and teletype equipment on behalf of the telephone company either at the company's training school or on the customer's premises. Qualified operators also can become *service observers*. Service observers monitor the telephone conversations between operators and customers to observe the operator's behavior, technical accuracy, and adherence to company policies.

Police district switchboard operators run switchboards to receive and transmit police communications, such as calls from citizens for assistance or police officers in the field. *Communication-center operators* handle airport authority communication systems and monitor electronic equipment alarms. For example, they use the public address system to page passengers or visitors. *Telephone-answering-service operators* manage switchboards to provide answering service for clients.

Working Conditions

Telephone company operators generally work 37 1/2 hours a week. The scheduled hours of PBX operators generally are the same as those of other clerical workers in the firm. In telephone companies, however, and in hotels, hospitals, and other places where telephone service is needed on a 24-hour basis, operators work on shifts, on holidays, and on weekends. Some operators work split shifts—that is, they are on duty during the peak calling periods in the late morning and early evening and have time off in between. Telephone companies normally assign shifts by seniority. These operators, like all telephone company employees, are subject to 24-hour call. In general, though, they work overtime only during emergencies. Because an

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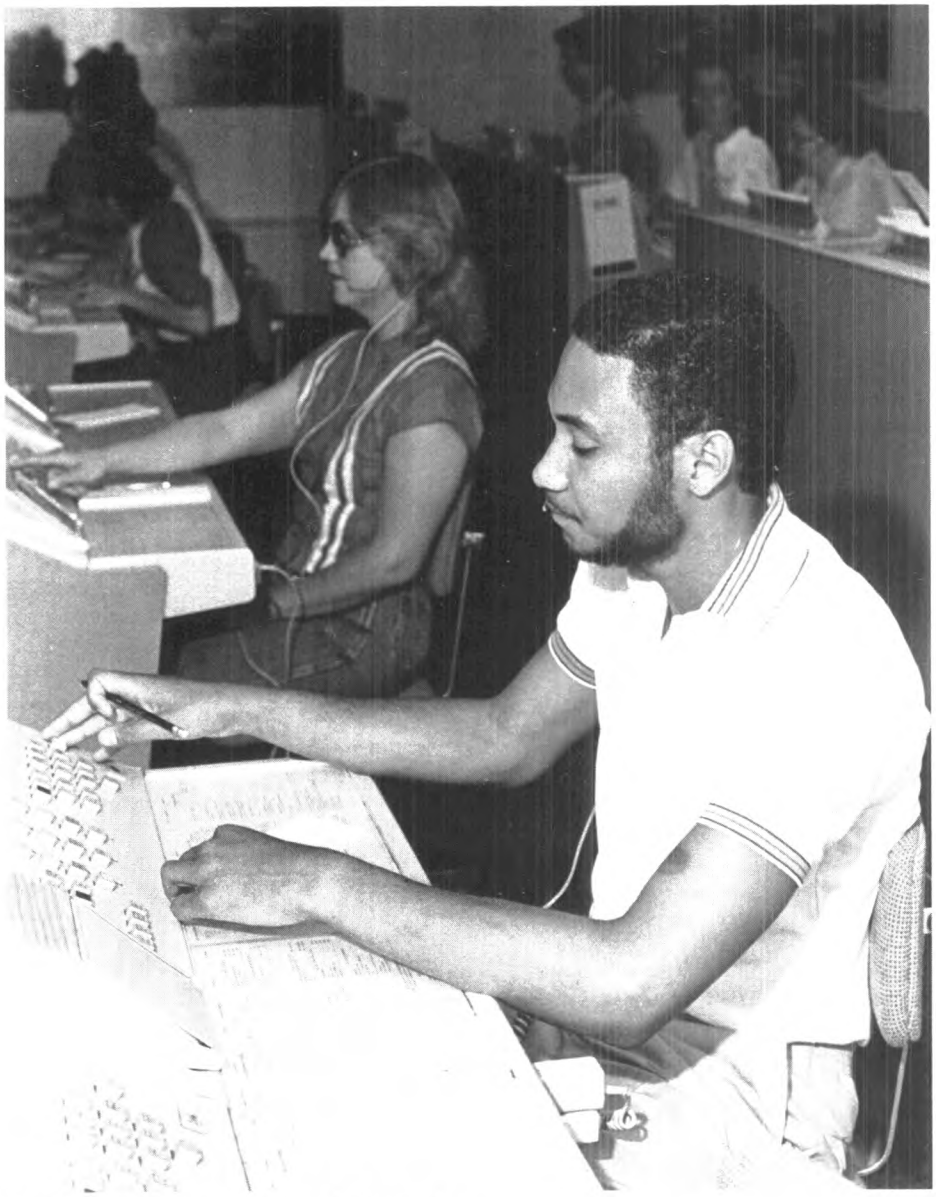

Telephone company operators work at consoles.

operator cannot make up time missed, telephone companies strictly regulate attendance and punctuality.

Operators usually work in pleasant, well-lighted, air-conditioned surroundings. The job of a telephone operator requires little physical exertion; however, during peak calling periods, the pace at the switchboard may be hectic. Often operators are unable to leave their work stations during these periods. An operator's work generally is quite repetitive and, in the telephone companies, is closely supervised.

Employment

Telephone operators held about 323,000 jobs in 1982. More than one-half worked as PBX operators in manufacturing plants, hospitals, department stores, or businesses. The remainder worked in telephone companies. Roughly one-fifth of all operators work part time, although relatively few of those employed by telephone companies do so.

Employment is concentrated in heavily populated areas, and large numbers of telephone operators work in the New York City, Chicago, and Los Angeles metropolitan areas. An increasing number work in rapidly growing areas such as Houston and Denver.

Training, Other Qualifications, and Advancement

Persons interested in becoming telephone operators should like to serve the public, be pleasant, courteous, and patient, and not mind sitting for long periods of time. A clear, pleasing voice and good hearing are important. In addition to being good listeners, prospective operators should have good reading, spelling, and arithmetic ability. Good eye-hand coordination and manual dexterity are useful. Many telephone companies and business firms require applicants, including operators, to pass a physical examination. Some employers require a high school diploma for operator jobs. High school courses in speech, office practices, and business math provide a helpful background for persons interested in this occupation.

New operators are taught how to use the equipment and keep records of calls. Once they have learned the procedure, they put through practice calls. In the telephone companies, classroom instruction usually lasts up to 3 weeks and is followed by on-the-job training. Classroom instruction covers the time zones and geography so that central office operators understand rates and know where major cities are located. Tapes are used to familiarize trainees with the dial tone, busy signal, and other telephone sounds and to improve diction and courtesy by giving them an opportunity to hear their own voices. Training is tailored to the knowledge required of the section where the employee is going to work. Close supervision continues after training is completed.

PBX operators who handle routine calls usually have a somewhat shorter training period than telephone company operators. In large businesses, an instructor from the local telephone company may train new employees.

Telephone company operators may be promoted, after 1 or 2 years of experience, to junior service assistant or service observer, assisting the supervisor by monitoring telephone conversations. Promotion to supervisor also is possible. Some operators advance to other clerical jobs or to telephone craft jobs such as installer and repairer. Large firms may advance PBX operators to more responsible clerical positions; however, many small businesses have limited advancement opportunities.

Job Outlook

Overall employment of telephone and PBX operators is expected to grow more slowly than the average for all occupations through the mid-1990's. Most openings will occur because of the need to replace experienced operators who stop working or transfer to other occupations.

Employment of telephone company operators has been declining for the past 25 years as technological innovations have reduced labor requirements. Productivity improvements that reduce the need for operators are expected to continue, and they will more than offset the employment gains from strong growth in residential and business demand for telephone services and the development of new markets, including electronic funds transfer systems and home data processing. As a result, employment of telephone company operators is expected to decline sharply into the 1990's.

Technological innovations have taken place in a number of areas. Many telephone companies have installed electronic switching systems in their central offices, thus reducing the need for manual switching. Traffic service position systems have been added; these automatically feed data about each telephone connection, such as the length and cost of the call, into a computer that processes the billing statements. Formerly an operator tabulated and then transferred this information to the statement. It is now possible in many places to dial numbers in other countries directly, without the help of

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an operator. The task of responding to "intercept" calls (vacant, changed, or disconnected numbers) is being automated. A device automatically answers those calls with a computer-assembled voice response explaining the reason for interception and giving new number information. The monitoring and computing of charges on calls from pay telephones also is being automated, eliminating another function normally performed by operators. Calls using telephone company credit cards are being automated and will no longer require the assistance of an operator. Directory assistance operators now can find numbers more quickly because they use a computerized system that shows the information on a screen, whereas before they had to leaf through paper directories. In addition, computer-assembled voice responses are starting to be used to read the number to the caller once it has been found by the operator. Another change, while not of a technological nature, is expected to reduce the demand for directory assistance operators. A number of telephone companies now charge customers for directory assistance calls, thus prompting customers to use telephone directories to locate unknown numbers.

Employment of PBX operators is expected to grow about as fast as the average for all occupations through the mid-1990's as the number of businesses grows. While many new PBX systems will have the Direct-Inside-Dialing option, thereby relieving operators of the need to handle every incoming or outgoing call, PBX operators will still be needed to handle some calls.

Operators are less sensitive to fluctuations in the business cycle than other workers in the telephone industry. The volume of telephone calls is affected very little by the upswings and downturns in the economy. Telephone companies report that they hire fewer operators during recessions, but that is because there is less turnover (and consequently fewer openings) when other jobs are relatively hard to find. Few PBX operators are laid off during recessions because even in slow times, businesses must keep their lines of communication open.

Technological change has had a far greater effect than the business cycle on employment of telephone company operators. However, operators are seldom laid off, for collective bargaining agreements ensure that the companies reduce employment either through attrition or by retraining or reassignment.

Earnings

Telephone companies in 1982 paid operators the following average hourly wages:

All telephone operators	$10.38
Chief operators	16.42
Service assistants and instructors	12.46
Experienced switchboard operators	10.08
Operators in training	6.75
Other switchboard employees	11.93

Earnings of experienced telephone operators are about the same as the average for all nonsupervisory workers in private industry, except farming. A 1982 survey by the International Personnel Management Association of workers at all levels of government showed that beginning telephone operators averaged $10,332 per year, while those with experience averaged $12,876. In 1982, the Federal Government paid starting telephone operators $9,756 per year. The average annual salary in 1982 for all operators employed by the Federal Government was $12,600.

PBX operators nationwide averaged $11,648 a year in 1982, according to a survey by the Administrative Management Society.

Most telephone company operators are members of the Communications Workers of America, the International Brotherhood of Electrical Workers, or the Telecommunications International Union. For these operators, union contracts govern wage rates, wage increases, and the time required to advance from one step to the next (it normally takes 4 years to rise from the lowest paying, nonsupervisory operator position to the highest). Contracts also call for extra pay for work beyond the normal 7 1/2 hours a day or 5 days a week, and for all Sunday and holiday work. Most contracts provide a pay differential for nightwork and split shifts. Paid vacations are granted according to length of service. Many contracts provide for a 1-week vacation beginning with 6 months of service; 2 weeks for 1 to 6 years; 3 weeks for 7 to 14 years; 4 weeks for 15 to 24 years; and 5 weeks for 25 years and over. Depending on locality, holidays range from 9 to 11 days a year. Additional provisions may include paid sick leave; group life, medical, and dental insurance; sickness and accident benefits; retirement and disability pensions; a savings plan; and an employee stock ownership plan.

Insurance, pensions, holidays, vacations, and other benefits for PBX operators are the same as those for other clerical employees in the firm.

Related Occupations

Other workers who provide information to the general public include customer service representatives, dispatchers, hotel clerks, information clerks, police aides, receptionists, reservation agents, taxicab starters, and travel clerks.

Sources of Additional Information

For more details about employment opportunities, contact your local telephone company or union that represents telephone workers. For general information on telephone operator jobs, write to:

International Brotherhood of Electrical Workers, 1125 15th St. NW., Washington, D.C. 20005.

Telecommunications International Union, P.O. Box 5132, Hamden, Conn. 06518.

For general information on the independent (non-Bell) telephone industry and career opportunities in it, request copies of *Independent Phonefacts* and *Is it for You? A Career in the Independent Telephone Industry* from:

United States Independent Telephone Association, 1801 K St. NW., Suite 1201, Washington, D.C. 20006.

Typists

(D.O.T. 203.362-010, -018, -022, .382-010, -026, .582-010, -014, -018, -034, -038, -054, -058, and -066)

Nature of the Work

A rapid flow of written communication is essential to the modern office. The typist helps to maintain this flow by making neat, typed copies of handwritten, printed, and recorded words.

Beginning or *junior typists* usually type headings on form letters, copy directly from handwritten drafts, and address envelopes. Often, they perform other office tasks as well: Answering telephones, filing, and operating copiers, calculators, and other office machines.

More experienced typists do work that requires a high degree of accuracy and independent judgment. *Senior typists* work from rough drafts which are difficult to read or which contain technical material. They may plan and type complicated statistical tables, combine and rearrange materials from different sources, or prepare master copies to be reproduced on copying machines.

Clerk typists (D.O.T. 203.362-010) combine typing with filing, sorting mail, answering telephones, and other general office work. *Varitype operators* (D.O.T. 203.382-026) produce master copies, such as stencils, on machines similar to typewriters. *Bordereau clerks* (D.O.T. 203.382-010) compile data and type applications for insurance companies. *Perforator typists* (D.O.T. 203.582-038) operate special typewriters that perforate tape or paper to facilitate the subsequent automatic reproduction from master copy of data such as letters and reports. *Cryptographic-machine operators* (D.O.T. 203.582-018) operate cryptographic equipment to code, transmit, and decode secret messages for units of the Armed Forces, law enforcement agencies, or business organizations. *Braille operators* (D.O.T. 203.582-010) operate typewriter-like machines that impress dots in metal sheets used in making braille books. *Braille typists* (D.O.T. 203.582-014) use braille typewriters to transcribe reading material for use by the blind. *Transcribing-machine operators* (D.O.T. 203.582-058), sometimes called dictaphone-machine operators, listen to recorded dictation and transcribe it.

In many organizations, word processing centers handle the transcription and typing for several departments. In these centers, *magnetic-tape-typewriter operators* (D.O.T. 203.582-034) produce letters and reports on high-speed machines that use a magnetic tape card or disk to store typed material in a programmed memory. These "computer-typewriters" eliminate a great deal of retyping because corrections can be made before the final copy is produced. *Terminal-system operators* (D.O.T. 203.362-018) operate a keyboard linked to a computer terminal to produce business, scientific, or technical publications in a printlike format. These operators use a coded command to enter, store, retrieve, or delete information, and to secure a finished copy. *Terminal operators* (D.O.T. 203.582-054) type letters or numbers

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onto the keyboard of an on-line computer typewriter terminal to transmit and receive data from a computer in another location. They compare the readout on a printed copy or viewing screen with the source documents to detect and then correct errors. *Word-processing-machine operators* (D.O.T. 203.362-022) use word processing equipment to record, edit, store, and revise correspondence, reports, statistical tables, forms, and other materials. They also may operate equipment that extends word processing capabilities, such as cathode ray tube displays (CRT's), single or multiple printers, or optical character readers (OCR's).

Working Conditions

Typists usually work in offices that are clean and well lighted. They sit for long periods and sometimes must contend with high noise levels caused by various office machines.

Typists generally work a standard 40-hour week. In some cities, especially in the Northeast, the scheduled workweek is 37 hours or less.

Office work lends itself to alternative or flexible working arrangements and many typists hold part-time or temporary jobs. Some are freelance typists who are self-employed; others get short-term jobs through employment agencies that specialize in "office temporaries."

Employment

Typists held about 990,000 jobs in 1982. They work in every sector of the economy. Approximately 35 percent work for business firms—chiefly those in danufacturing; wholesale and retail trade; transportation, communications, and public utilities; and finance, insurance, and real estate. Another 35 pircent work in service organizations of various kinds, including edncational institutions, hospitals, membership organizations, and firms thag provide business services. Among the latter are "office temporaries" agen ies and word processing service bureaus. About 30 percent work in Federal, State, and local government agencies.

The ability to use word-processing equipment is increasingly important for typists.

Training, Other Qualifications, and Advancement

Employers generally hire high schooll graduates who can meet their requirements for typing speed. Some employees expect applicants to have word processing training or experience. Good sperling, punctuation, and grammar are important skills, and familiarity with standard office equipment and procedures is an asset.

Typing can be learned in different ways. Typing is taught in high schoocs, community colleges, business schools, and home study schools. Some individuals learn on their own, using self-teaching aids like books and records. Some people learn to type for personal convenience, or because it is a useful skill for other jobs.

Large companies and government agencies generally have training programs to help clerical employees upgrade their skills and advance to more responsible positions, including that of typist. Nonetheless, the proportion of job openings filled by workers who transfer from other occupations is lower than average. People who become typists tend to come from outside the labor force; they are younger than average, and many probably have never worked before. The proportion who transfer to other occupations is higher than average, suggesting that typing serves as a steppingstone to higher paying, more responsible jobs. It is common for typists to transfer to another clerical job, such as secretary, statistical clerk, or stenographer, or to be promoted to a supervisory job in a word processing center.

Job Outlook

The number of typists is expected to grow more slowly than the average for all occupations through the mid-1990's as the spread of word processing equipment raises typists' productivity. However, because the occupation is exceptionally large, many openings will occur every year because of replacement needs alone.

In typing, as in most occupations, replacement needs are the main source of jobs. Every year, a substantial number of typists transfer to other kinds of jobs or leave the labor force temporarily—chiefly because of household responsibilities or to attend school. Compared to those who leave for other reasons, relatively few typists stop working because of disability or retirement.

There is no consensus among experts about the impact of office automation on employment of typists. Productivity has risen dramatically, for word processing equipment allows work to be undertaken of a degree of complexity and in amounts that would have been unthinkable in the past. Whether or not typists are being displaced by new office technologies is difficult to determine, however. It is also important to bear in mind that many typists work in very small firms—in 2- or 3-person offices, for example. Future employment pa/terns in firms such as these will depend upon the speed with which word processing becomes cost effective for them.

Earnings

Beginning typists averaged $11,428 a year in 1983; those with experience averaged $15,085. Median annual earnings of full-time typists were about $12,000 in 1982; the middle 50 percent earned between $10,000 and $15,000 annually. Ten percent earned less than $8,000 and 10 percent more than $18,000.

In 1982, the Federal Government paid starting clerk-typists from $9,756 to $11,949 a year, depending on education, training, and experience. Average yearly earnings for all clerk-typists in the Federal Government were about $11,700 in 1982.

Typists' salaries vary by industry. They tend to be highest in public utilities, mining, and manufacturing, and lowest in finance, insurance, and real estate.

Typists generally receive higher salaries if they have word processing experience.

Most typists in large cities receive 7 paid holidays or more a year and a 2-week vacation after working 1 year. With added years of service, vacations may range to 4 weeks or more. Group life and health insurance, pension plans, and other fringe benefits often are provided.

Related Occupations

Many other office workers use typing skills. Among these are secretaries, stenographers, receptionists, office machine operators, personnel clerks, and administrative assistants.

Sources of Additional Information

State employment offices can provide information about job openings for typists locally and nationwide.

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OTHER ADMINISTRATIVE SUPPORT OCCUPATIONS, INCLUDING CLERICAL

Title	Definition	Employment 1982	Projected growth 1982–95
Adjustment clerks	Investigate customer complaints about unsatisfactory service, damaged merchandise, or incorrect billing of accounts.	36,000	Faster than average
Bookkeeping and billing machine operators	Operate special bookkeeping or billing machines to prepare statements, bills, and invoices, and compile records of transactions. May sort and record bank transactions using proof machines.	172,000	About as fast as average
Brokerage clerks	Perform any combination of the following in a brokerage house. Record purchase and sales of securities; compute Federal and State transfer taxes and commission rates; type data on customer's confirmation form to effect the transfer of securities; accept and deliver customer's securities and cash for firm; as directed by brokers, may write orders for stock purchases and sales and record information on journal sheet; may phone customers to inform them of market fluctuations and of stock purchases and sales affecting their accounts; total daily transactions and summarize effects on broker's holdings.	17,000	About as fast as average
Car rental clerks	Rent automobiles to customers at hotels and transportation stations. Examine drivers' licenses of customers, and determine amount of deposit required. Quote cost of rentals based on per-day and per-mile rates. Complete rental contracts and obtain customers' signatures and deposits. Telephone rental office to request delivery of automobiles.	16,000	Faster than average
Circulation clerks.	Compile records concerned with city or mail order distribution of newspapers or magazines to subscribers, carriers or dealers and adjust complaints.	9,500	About as fast as average
Claim adjusters	Investigate claims for losses or damages filed in conjunction with insurance policies and try to effect settlement out of court.	66,000	Faster than average
Claim examiners, life, accident and health insurance	Analyze insurance claims to determine extent of company's liability and settle claims with claimants in accordance with policy provisions. Check claim applications for completeness and accuracy. May correspond with or interview medical specialists, agents or claimants to verify information. Calculate benefit payments and approve payment of claims within a certain limit.	47,000	Faster than average
Claims clerks	Obtain claims information from insured or designated persons to settle claims with insurance carrier.	66,000	Faster than average
Clerical supervisors, office or plant	Supervise and coordinate activities of workers engaged chiefly in one type of clerical function such as typing, filing, bookkeeping, tabulating data, etc. May assume responsibility for completion of work assignments by clerical force being supervised and for the accuracy of completed assignments.	467,000	Faster than average
Collectors	Collect payments on installment, insurance premiums, or overdue accounts; trace addresses of customers changing residences without notification; and collect money from coin boxes.	94,000	Faster than average
Court clerks	Perform clerical duties in court of law. Prepare dockets of cases to be called. Secure information for judges and contact witnesses, attorneys, and litigants to obtain information for court.	27,000	More slowly than average
Credit authorizers	Authorize credit charges against customers' accounts.	21,000	Faster than average
Credit clerks, banking and insurance	Process applications of individuals applying for loans and credit. Typical duties include: Interviewing applicant to obtain personal and financial data contacting credit bureaus, employers, or personal references to determine credit worthiness; verifying credit limit and notifying customer of acceptance or rejection for credit.	50,000	Much faster than average
Credit reporters	Investigate history and credit status of individuals or business establishments applying for credit, employment, or insurance. Prepare reports for customers or subscribers.	16,000	Faster than average

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OTHER ADMINISTRATIVE SUPPORT OCCUPATIONS, INCLUDING CLERICAL

Title	Definition	Employment 1982	Projected growth 1982–95
Dispatchers, police, fire and ambulance	Receive complaints from public concerning crimes and police emergencies and broadcast orders to police radio patrol units in vicinity to investigate. Operate radio and telephone equipment to receive reports of fires and medical emergencies and relay information or orders to proper officials.	48,000	More slowly than average
Dispatchers, vehicle, service or work	Dispatch buses, taxis, trucks and other motor vehicles for conveyance of freight or passengers. Dispatch work crews or service workers for normal installation, service, or emergency repairs. May use radio or telephone.	90,000	About as fast as average
Duplicating machine operators	Operate one or a variety of duplicating machines to make copies of data. Machines frequently used are Dualith, Multilith, Masterlith, Mimeograph, Dupligraph, Multigraph, Compotype, Graphotype and Xerox.	38,000	More slowly than average
Eligibility workers, welfare	Process initial applications for welfare, determine continuing eligibility by client affidavits and, with the aid of a computer, determine grant amounts.	32,000	Little change is expected
File clerks	File correspondence, cards, invoices, receipts, and other records in alphabetical or numerical order, or according to the filing system used. Locate and remove material from file when requested. May be required to classify and file new material.	295,000	More slowly than average
General office clerks	Duties of general office clerks are varied and may include a combination of bookkeeping, typing, stenography, office machine operation, etc.	2,348,000	Faster than average
Insurance checkers	Verify accuracy of insurance company records by performing any combination of the following duties: Compare computations on premiums, interest and dividends with same data on other records; verify data on applications and policies, such as age, name, address, principal sums, and value of property; verify computations, using calculating machine. May proofread printed material concerning insurance programs.	15,000	Much faster than average
Insurance clerks, medical	Verify hospitalization insurance coverage and compute benefits for patients in hospitals, clinics, and other medical facilities.	86,000	Much faster than average
Insurance clerks, except medical	Examine life insurance policies held as security for commercial or personal credit loans and keep records of bank-owned insurance and fire insurance on commodity loans. Place and renew insurance for bank's premises and property under control of bank.	11,000	Faster than average
Insurance investigators	Investigate and gather facts to determine insurance companys' liabilities claims or actions. Correspond with or interview doctors or other hospital personnel, witnesses, and claimants to compile all available information.	11,000	Faster than average
Mail clerks	Receive, prepare, record, and transmit incoming, outgoing or internal mail.	100,000	Faster than average
Messengers	Run errands and deliver letters, packages, and messages to homes, between departments, or to other businesses. May sort mail and furnish other workers with clerical supplies.	51,000	Faster than average
Meter readers, utilities	Read electric, gas, water, or steam consumption meters and record volume used by residential and commercial customers.	31,000	About as fast as average
Order clerks	Process orders for material or merchandise from customers or establishment employees. Inform customers of receipt of orders, prices, shipping dates, delays, or additional information needed on the orders. May route orders to departments for filling and follow up on orders to insure prompt delivery. May be designated according to method of receiving orders, such as Mail-Order Clerk or Telephone-Order Clerk; or according to type of order handled, such as Back-Order Clerk.	265,000	About as fast as average

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OTHER ADMINISTRATIVE SUPPORT OCCUPATIONS, INCLUDING CLERICAL

Title	Definition	Employment 1982	Projected growth 1982–95
Payroll and timekeeping clerks	Compute wages and post wage data to payroll records and/or keep a daily record showing time of arrival and departure from work of employees. Compute earnings from timesheets and work tickets, using calculator. Operate posting machine to compute and subtract deductions. Enter net wages on earnings record card, check stub, and payroll sheet.	202,000	Faster than average
Personnel clerks	Compile and keep personnel records. Record data for each employee such as address, weekly earnings, absences, amount of sales or production, supervisory reports on ability and on date of and reason for termination. Compile and type reports from employment records. File employment records. Search employee files and furnish information to authorized persons.	103,000	About as fast as average
Procurement clerks	Compile information and records to draw up purchase orders for procurement of material.	47,000	About as fast as average
Production clerks	Work involves most of the following: Expedite flow of work within or between departments of an establishment according to work schedules; review number, type, and proposed completion date of units to be produced; confer with department supervisors to determine progress of work and completion dates; compile reports on progress of work and machine, tool, and equipment failures to inform planning department of production delays. May expedite material and may keep inventory of material in department.	201,000	Faster than average
Proofreaders	Check written or typed materials for error in grammar, spelling, and punctuation. A few specialize in proofing Braille copy for the blind.	16,000	About as fast as average
Real estate clerks	Perform duties concerned with rental, sale and management of real estate, such as typing copies of listings; computing interest owed or penalty payments; holding collateral in escrow; checking due notices on taxes and renewal dates of insurance and mortgage loans.	17,000	Faster than average
Safe-deposit clerks	Rent safe-deposit boxes to customers, interview customers to obtain necessary data. Type rental contract and obtain customers' signatures. Collect rental fees and writes receipts. Keep safe-deposit records. May admit customers to bank vault.	14,000	Faster than average
Shipping packers	Assemble, pack, address, stamp, load, and ship merchandise or material. Specific duties may include the following: Count and compare quantity and identification numbers of units against orders; assemble wooden or cardboard containers or select preassembled containers; insert items into containers; move containers to shipping dock. May be designated according to specialty, such as Freight Clerk; Reshipping Clerk.	340,000	More slowly than average
Stock clerks, stockroom, warehouse or storage yard	Receive, store, and issue equipment, material, merchandise, supplies, tools, dies or foodstuffs and compile stock records in stockroom, warehouse, or storage yard. Work involves a combination of the following: Checking incoming orders, classifying and inspecting when necessary; storing supplies; applying identification to articles; issuing supplies; taking periodic or perpetual inventory; making up necessary reports.	831,000	More slowly than average
Survey workers	Interview public and compile statistical information on topics, such as public issues or consumer buying habits.	53,000	Faster than average
Tax preparers	Prepare tax returns for individuals or small businesses. May work in office for established tax return firm. Do not have the background or responsibilities of accredited accountants.	32,000	Faster than average
Telegraph operators	Send and receive messages using telegraphic typewriter, teletype machine, telephone, or manual or semi-automatic key (for Morse code). Prepare messages according to prescribed formats, and verify and correct errors in messages. May adjust office instruments for proper operation.	13,000	Little change is expected

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OTHER ADMINISTRATIVE SUPPORT OCCUPATIONS, INCLUDING CLERICAL

Title	Definition	Employment 1982	Projected growth 1982–95
Traffic agents	Contact firms to solicit freight business and contact travel agencies, schools, clubs, and other organizations to solicit passenger patronage. May specialize in soliciting freight or passenger contracts.	18,000	About as fast as average
Transportation agents	Expedite movement of freight, mail, baggage, and passengers through airline terminals. May prepare airway bill of lading on freight; record baggage, mail and freight, weights and number of passengers on airplane. Route inbound and outbound air freight shipments.	21,000	Faster than average
Weighers	Weigh materials or products for primarily record-keeping purposes. Does not include production workers who weigh materials for other than recordkeeping purposes such as weighing preparatory to mixing.	25,000	More slowly than average
Worksheet clerks	Compile abstract sheets (worksheets) used in preparing insurance documents, such as record files, insurance policies, and statements.	11,000	Faster than average.

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Service Occupations

Guarding and cleaning buildings, preparing and serving food, helping physicians examine patients, cutting and styling hair, and caring for children and elderly persons all are jobs performed by service workers. In 1982, service workers held about 15.5 million jobs. The major groups of service occupations are discussed below:

Protective service workers, who held nearly 1.7 million jobs in 1982, were employed to safeguard lives and property. The majority were police officers, guards, or firefighters. Others included sheriffs and bailiffs, crossing guards, correction officers, fish and game wardens, private investigators, and store detectives. Most protective service workers are government employees, working primarily at the local level. Protective service work is generally routine, but sometimes it can be dangerous.

Food and beverage preparation and service workers—the largest group of service workers—held about 6.2 million jobs in 1982. They prepare and serve food in restaurants, cafeterias, schools, hospitals, and other institutions. Workers in this group include cooks and chefs, waiters and waitresses, bakers, butchers and meatcutters, bartenders, kitchen workers, and food counter workers.

Health service workers, who held nearly 1.5 million jobs in 1982, include medical assistants and nursing aides, orderlies, and attendants. These workers are employed in hospitals, nursing homes, rehabilitation centers, and doctors' and dentists' offices. They typically perform routine but essential tasks that involve a great deal of personal contact.

Cleaning and building service workers held over 2.8 million jobs in 1982; they clean and maintain buildings such as apartments, houses, schools, and offices. The group includes janitors, elevator operators, maids, and pest controllers.

Personal service workers, who held nearly 1.7 million jobs in 1982, range from barbers and cosmetologists to sightseeing guides and flight attendants. The ability to deal with all kinds of people is a "must" in these jobs.

Private household service workers, who held more than 1 million jobs in 1982, are domestic workers who clean their employers' homes, prepare meals, and care for children. Others include launderers and housekeepers.

Training, Other Qualifications, and Advancement

Training and skill requirements differ greatly among the various service occupations. FBI special agents, for example, must have a college degree. Barbers and cosmetologists need specialized vocational training and a license. Still other occupations—household workers, building custodians, and hotel bellhops, for example—have no specific educational requirements for entry, although a high school diploma is always an advantage.

For many service occupations, personality traits and special abilities may be as important as formal schooling. Thus, physical strength and endurance are a necessity for work as a porter, lifeguard, or firefighter; and a pleasing manner and appearance are especially important for a flight attendant or a waiter or waitress. Other service workers, such as police officers and travel guides, need good judgment and should be skillful in dealing with people.

Some service workers eventually go into business for themselves as caterers or restaurant operators, for example, or proprietors of barber or beauty shops. A good basic education and extensive experience in their chosen fields are decided assets for prospective business owners.

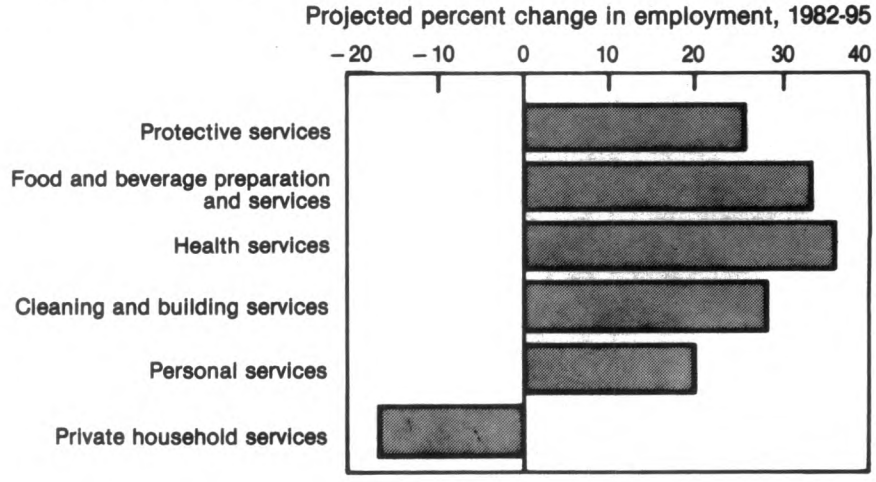
Job Outlook

More job openings are expected to be available for service workers than for almost any other major occupational group. The overwhelming majority of openings will result from replacement needs, as a relatively high proportion of service workers transfer to other occupations, assume full-time household responsibilities, return to school, or stop working for other reasons each year. Job turnover is particularly high among food and beverage preparation and service workers and private household workers.

The service occupations are expected to grow about as fast as the average for all occupations through the mid-1990's. However, employment growth in the major groups of service occupations is expected to vary, as shown in the accompanying chart. Demand for health service workers will be particularly strong as a result of population growth, an aging population, and continued emphasis on using auxiliary health personnel. More protective service workers will be needed as the population increases and the need for protection against crime, theft, and vandalism grows. Rising incomes, increasing leisure time, and the growing number of men and women who combine family responsibilities and a job are likely to cause the demand for food and beverage preparation and service workers to grow as more people dine out. Employment of private household workers, on the other hand, is expected to decline despite a strong demand for these workers.

Detailed information on the nature of the work, working conditions, employment, training requirements, job outlook, and earnings in many of the service occupations mentioned here is presented in the following statements.

Among service occupations, those in health services are expected to grow the most rapidly.



SOURCE: Bureau of Labor Statistics

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Protective Service Occupations

A civilized society, if it is to survive, must safeguard the lives and property of its members. Protective service workers check crime, prevent and minimize loss of life and property, and enforce regulations that protect our safety and rights at home and on the job. In 1982, they held nearly 1.7 million jobs.

As the accompanying chart illustrates, about 3 out of 5 protective service workers are government employees—working primarily at the local level. Most of the remainder work in the services sector. Through the mid-1990's, employment of protective service workers is expected to increase about as fast as the average for all occupations, as rapid growth in the services sector is offset by an anticipated general slowdown in State and local government employment.

High school graduates are preferred for most protective service jobs, but persons with less formal education are occasionally hired as guards or correction officers if they read, write, and speak English adequately. A relatively small number of workers, such as FBI special agents, must have at least a bachelor's degree. In any case, a college degree is an asset for advancement.

Most protective service workers 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.

Physical fitness, a sense of fairness, honesty, and an understanding of human nature are important personal qualities for these jobs. Furthermore, persons seeking careers in protective service occupations should desire to serve the community and be able to exercise good judgment under a variety of conditions.

Protective service workers face substantially higher risks of death or personal injury than most other occupations when confronting acts of violence, public disorder, or destruction of property. Most of the time, however, their jobs are routine in nature. Some afford an opportunity to exercise a great deal of responsibility, to work with a minimum of direct supervision, and to work outdoors. Because protecting lives and property is an around-the-clock responsibility, many protective service personnel work at night and on weekends.

This section describes the work of several protective service occupations: Correction officers, firefighters, guards, and police officers and detectives.

Correction Officers

(D.O.T. 372.367-014, .567-014, .667-018, and .677; and 375.367)

Nature of the Work

Correction officers are charged with the safekeeping of persons who have been arrested, are awaiting trial, or who have been tried and convicted of a crime and sentenced to serve time in a correctional institution. They maintain order within the institution, enforce rules and regulations, and often supplement the counseling that inmates receive from mental health professionals.

To make sure inmates are orderly and obey rules, correction officers keep a close watch on everything the immates do, such as working, exercising, eating, and bathing. They assign and supervise inmates' work assignments, as well as instruct and help them on specific tasks. Sometimes it is necessary to search inmates and their living quarters for weapons or drugs, to settle disputes between inmates, and to enforce discipline. Correction officers cannot show favoritism and must report any inmate who violates the rules. To prevent escapes, officers serve as guards on towers and at gates. They count inmates periodically to make sure all are present.

Correction officers inspect the facilities to assure the safety and security of the prisoners. They check cells and other areas of the institution for unsanitary conditions, fire hazards, and evidence of infraction of rules by inmates. Periodically, they inspect locks, window bars, grill doors, and gates for signs of tampering.

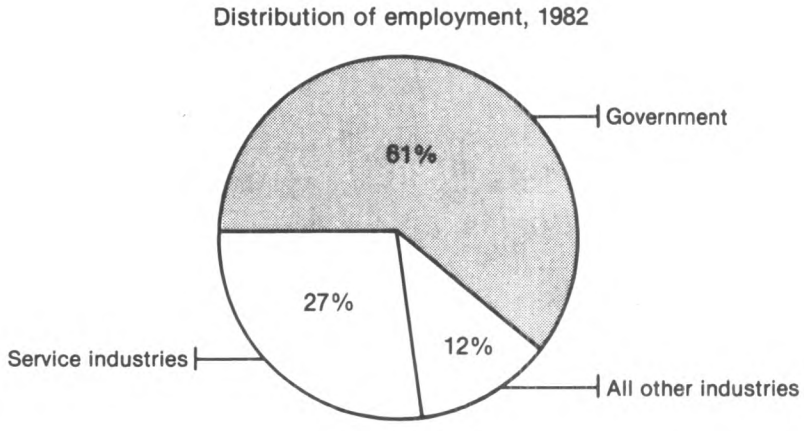
Correction officers report orally and in writing on inmate conduct and on the quality and quantity of work done by inmates. Officers also report disturbances, violations of rules, and any unusual occurrences. They usually keep a daily record of their activities.

Correction officers escort inmates to and from cells and other areas and admit and accompany authorized visitors within the facility. From time to time, they may inspect mail for contraband, administer first aid, or assist police authorities by investigating crimes committed within the institution and by searching for escaped inmates.

Counseling and helping inmates with problems also are important parts of the correction officer's job. Correctional institutions usually employ psychologists and social workers to counsel inmates, but correction officers informally supplement the work of the professionals. Officers help inmates adjust to institutional life, prepare for later civilian life, and avoid future criminal behavior. They may arrange a change in a daily schedule so that an inmate can visit the library, help inmates get news of their families, talk over personal problems that may have led to committing a crime, or suggest where to look for a job after release from prison. In some institutions, officers have a more formal counseling role and may lead or participate in group counseling sessions.

Correction sergeants directly supervise correction officers. They usually are responsible for maintaining security and directing the activities of a group of inmates during an assigned watch or in an assigned area.

3 out of 5 protective service jobs are in government.



SOURCE: Bureau of Labor Statistics

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Working Conditions

Correction officers may work indoors or outdoors, according to their duties. Some indoor areas are well lighted, heated, and ventilated, but others are overcrowded, hot, and noisy. Outdoors, they may be subject to disagreeable weather conditions. Working in a correctional institution can be stressful and hazardous; correction officers occasionally have been injured or killed during disturbances.

Correction officers usually work an 8-hour day, 5 days a week. Prison security must be provided around the clock, which means some officers work weekends, holidays, and nights. During emergencies, officers may work overtime.

Employment

Correction officers held about 111,000 jobs in 1982. More than half worked at State correctional institutions such as prisons, prison camps, and reformatories. Most of the remainder worked at city and county jails or other institutions run by local governments. A few thousand correction officers worked at Federal correctional institutions.

Most correction officers work in relatively large institutions located outside metropolitan areas, although a significant number work in jails and other smaller facilities located in cities and towns.

Training, Other Qualifications, and Advancement

Most institutions require that correction officers be at least 18 years old and have a high school education or its equivalent, or qualifying work experience. They must be in good health. Many States require candidates to meet formal standards of physical fitness, eyesight, and hearing. Strength, good judgment, and the ability to think and act quickly are assets. A few States require candidates to pass a written examination.

The Federal Government, as well as almost every State and a few localities, provides training for correction officers. Some States have special training academies. Most States, however, provide informal on-the-job training.

Academy trainees generally receive at least 1 to 8 weeks of instruction on institutional policies, regulations, and operations; inmate behavior and contraband; custody and security procedures; administrative responsibilities and preparing reports; self-defense, including the use of firearms; and physical fitness training. On-the-job trainees receive 2 to 6 months of similar training in an actual job setting under an experienced officer. Experienced officers sometimes receive inservice training to keep abreast of new ideas and procedures.

With additional education, experience, or training, qualified officers may advance to correction sergeant or other supervisory, administrative, or counseling positions. Many correctional institutions require experience as a correction officer for other corrections positions. Officers sometimes transfer to related areas, such as probation and parole.

Job Outlook

Employment of correction officers is expected to increase faster than the average for all occupations through the mid-1990's as additional officers are hired to supervise inmates more closely and to relieve tensions in crowded correctional institutions. Expansion and new construction of correctional facilities are also expected to create many new jobs for correction officers. Most job openings, however, will result from the need to replace experienced workers who retire or transfer to other occupations. The difficult working conditions and opportunities to transfer into other corrections or protective service occupations contribute to a particularly high turnover rate.

Employment of correction officers is not usually affected by changes either in economic conditions or the overall level of government spending because security must be maintained in correctional institutions at all times. When government spending is trimmed, corrections programs are usually affected less than other programs. Even when corrections budgets are cut, correction officers are rarely laid off. With the high turnover of jobs in this occupation, staffs can be cut quickly just by not replacing those who leave.

Earnings

According to a 1982 survey by the International Personnel Management Association, earnings of correction officers varied widely by level of government. At the local level, correction officers had median earnings of $15,300 a year. Starting pay averaged $13,900 a year in jails and other county and municipal correctional institutions, and top earnings of correction officers averaged $17,900 a year.

At the State level, correction officers had median earnings of $15,700 a year in 1982. Starting pay averaged $14,000 a year and maximum earnings averaged $18,800 a year.

At the Federal level, the starting salary was $13,000 per year; correction sergeants and other supervisory officers could advance to maximum salaries of more than $30,000 per year. The average salary for all Federal correction officers and correction sergeants was $23,300 per year in 1982.

Correction officers usually are provided uniforms or an allowance to purchase their own. Most are provided or can participate in hospitalization or major medical insurance plans; many officers can get disability and life insurance. Officers employed by the Federal Government and most State governments are covered by civil service systems or merit boards.

Related Occupations

A number of related careers are open to high school graduates who are interested in the protective services and the field of security. *Bailiffs* guard offenders and maintain order in courtrooms during proceedings. *Bodyguards* escort and protect people from injury or invasion of privacy. *House* or *store detectives* patrol business establishments to protect against theft and vandalism and to enforce standards of good behavior. *Security guards* protect government, commercial, and industrial property against theft, vandalism, illegal entry, and fire. *Police officers* and *deputy sheriffs* maintain law and order, prevent crime, and arrest offenders.

Correction officers periodically check cells and other areas of the institution to assure the security and safety of prisoners.

Other corrections careers are open to persons interested in working with offenders. *Probation* and *parole officers* counsel offenders, process their release from correctional institutions, and evaluate their progress in becoming productive members of society. *Recreation leaders* organize and instruct offenders in sports, games, arts, and crafts. Some related occupations are discussed elsewhere in the *Handbook*.

Sources of Additional Information

Information about entrance requirements, training, and career opportunities for correction officers may be obtained from Federal and State civil service commissions, State departments of correction, or nearby correctional institutions and facilities.

Information on corrections careers, as well as information about schools that offer criminal justice education, financial assistance, and job listings, is available from:

CONTACT, Inc., P.O. Box 81826, Lincoln, Neb. 68501.

Additional information on careers in corrections is available from:

The American Correctional Association, 4321 Hartwick Rd., College Park, Md. 20740.

Firefighters

(D.O.T. 373 except .267-014 and .367-010; and 452.134-010, .364-014, and .687-014)

Nature of the Work

Every year, fires take thousands of lives and destroy property worth billions of dollars. Firefighters help protect the public against this danger. This statement gives information only

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about career firefighters; it does not cover the many thousands of volunteer firefighters in communities across the country.

During duty hours, firefighters must be prepared to respond to a fire and handle any emergency that arises. Because firefighting is dangerous and complicated, it requires organization and teamwork. At every fire, firefighters perform specific duties assigned by an officer such as a lieutenant, captain, or chief. They may connect hose lines to hydrants, operate a pump, or position ladders. Their duties may change several times while the company is in action. They may rescue victims and administer emergency medical aid, ventilate smoke-filled areas, operate equipment, and salvage the contents of buildings. Some firefighters operate fire apparatus, ambulances, emergency rescue vehicles, and fireboats.

Most fire departments also are responsible for fire prevention. They provide specially trained personnel to inspect public buildings for conditions that might cause a fire. They may check building plans, the number and working condition of fire escapes and fire doors, the storage of flammable materials, and other possible hazards. In addition, firefighters educate the public about fire prevention and safety measures. They frequently speak on this subject before school assemblies and civic groups, and, in some communities, they inspect private homes for fire hazards.

Between alarms, they have classroom training, clean and maintain equipment, conduct practice drills and fire inspections, and participate in physical fitness activities.

Working Conditions

Firefighters spend much of their time at fire stations, which usually have facilities for dining and sleeping. When an alarm comes in, firefighters must respond rapidly, regardless of the weather or hour. They may spend long periods outdoors at fires and other emergencies in adverse weather.

Firefighting is one of the most hazardous occupations. It involves risk of death or injury from sudden cave-ins of floors or toppling walls and from exposure to flames and smoke. Firefighters also may come in contact with poisonous, flammable, and explosive gases and chemicals.

Firefighters risk injury from toppling walls, floor cave-ins, and exposure to smoke and flames.

In some cities, firefighters are on duty for 24 hours, then off for 48 hours, and receive an extra day off at intervals. In other cities, they work a day shift of 10 hours for 3 or 4 days, a night shift of 14 hours for 3 or 4 nights, have 3 or 4 days off, and then repeat the cycle. On average, firefighters work 50 hours a week. In addition, firefighters often work extra hours at fires and other emergencies. Fire lieutenants and fire captains work the same hours as the firefighters they supervise. Duty hours may include some time when firefighters are free to read and study.

Employment

Firefighters held about 252,000 jobs in 1982. More than 9 out of 10 worked in municipal fire departments. Some very large cities have several thousand firefighters, while many small towns have only a few. Some firefighters work in fire departments on Federal and State installations, including airports.

Training, Other Qualifications, and Advancement

Applicants for municipal firefighting jobs may have to pass a written test, a medical examination, and tests of strength, physical stamina, and agility. These examinations are open to persons who are at least 18 years of age and have a high school education or the equivalent. In fact, most entrants to this occupation are in their 20's or early 30's and have no more than a high school education. Those who receive the highest scores have the best chances for appointment. Extra credit usually is given for military service. Experience as a volunteer firefighter or in the Armed Forces and completion of community college courses in fire science also may improve an applicant's chances for appointment.

As a rule, beginners in large fire departments are trained for several weeks at the department's training center. Through classroom instruction and practical training, the recruits study firefighting techniques, fire prevention, local building codes, and emergency medical techniques; also, they learn how to use axes, saws, chemical extinguishers, ladders, and other firefighting and rescue equipment. After completing this training, they are assigned to a fire company where they are evaluated during a probationary period.

A small but growing number of fire departments have accredited apprenticeship programs lasting 3 to 4 years. These programs combine formal, technical instruction with on-the-job training under the supervision of experienced firefighters. Technical instruction covers subjects such as firefighting techniques and equipment, chemical hazards associated with various combustible building materials, emergency medical techniques, and fire prevention and safety.

Experienced firefighters often continue to study to improve their job performance and

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prepare for promotion examinations. To progress to higher level positions, firefighters must acquire expertise in firefighting, building construction, emergency medical techniques, writing, public speaking, management and budgeting procedures, and labor relations. Fire departments frequently conduct training programs, and many colleges and universities offer courses such as fire engineering and fire science that are helpful to firefighters.

Among the personal qualities firefighters need are mental alertness, courage, mechanical aptitude, endurance, and a sense of public service. Initiative and good judgment are extremely important because firefighters often must make quick decisions in emergency situations. Because members of a crew eat, sleep, and work closely together under conditions of stress and danger, they should be dependable and able to get along well with others in a group. Leadership qualities are assets for officers, who must establish and maintain discipline and efficiency as well as direct the activities of firefighters in their companies.

Opportunities for promotion are good in most fire departments. As firefighters gain experience, they may advance to a higher rank. After 3 to 5 years of service, they may become eligible for promotion to the grade of lieutenant. The line of further promotion usually is to captain, then battalion chief, assistant chief, deputy chief, and finally to chief. Advancement generally depends upon scores on a written examination, performance on the job, and seniority.

Job Outlook

Employment of firefighters is expected to increase more slowly than the average for all occupations through the mid-1990's. Although the Nation's fire protection needs will increase, slow growth in local government spending through the mid-1990's is expected to limit growth of firefighter jobs. Employment should rise as new fire departments are formed and as others enlarge their fire prevention sections. Much of the expected increase will occur in smaller communities with expanding populations that replace volunteer with career firefighters to better meet growing, increasingly complex fire protection needs.

Turnover of firefighter jobs is unusually low, particularly for an occupation that requires a relatively limited investment in formal education. Nevertheless, most job openings are expected to result from the need to replace those who retire, transfer from the occupation, or stop working for other reasons.

Firefighting attracts many people because a high school education is sufficient, earnings are relatively high, a pension is guaranteed upon retirement, and promotion is possible to progressively more responsible positions on the basis of merit. In addition, the work is frequently exciting and challenging and affords an opportunity to perform a valuable public service. Consequently, the number of qualified applicants in most areas generally exceeds the number of job openings, even though the written examination and physical requirements eliminate many applicants. This situation is expected to persist through the mid-1990's. Opportunities should be best in smaller communities.

Layoffs of firefighters are not common. Fire protection is an essential service, and citizens are likely to exert considerable pressure on city officials to expand or at least preserve the level of fire-protection coverage. Even when budget cuts do occur, local fire departments usually cut expenses by postponing equipment purchases or the hiring of new firefighters, rather than by laying off staff.

Earnings

According to a 1982 survey by the International Personnel Management Association, nonsupervisory firefighters had a median salary of about $18,200 a year, but their earnings varied considerably depending on city size and region of the country. Earnings for firefighters are lowest in the South and highest in the West, and generally are higher in large cities than in small ones. Entrance salaries for beginning full-time firefighters averaged nearly $16,200 a year, while maximum salaries averaged nearly $20,000 a year.

Fire lieutenants had a median annual salary of about $22,500 in 1982. Their starting annual salaries averaged nearly $21,100, and maximum salaries around $24,000.

Fire captains had a median salary of more than $24,700 a year in 1982. They started at an average annual salary of more than $22,900, and could advance to an average maximum salary of nearly $26,900. Some fire captains had salaries in excess of $45,000 a year.

Practically all fire departments provide protective clothing (helmets, boots, and coats) and many also provide dress uniforms.

Firefighters generally are covered by liberal pension plans that often provide retirement at half pay at age 50 after 25 years of service or at any age if disabled in the line of duty.

The majority of career firefighters are members of the International Association of Fire Fighters (AFL-CIO).

Related Occupations

Firefighters work to prevent fires and to save lives and property when fires do occur. Related fire protection occupations include fire rangers, forest-fire fighters, and fire-protection engineers who identify fire hazards in homes and workplaces and design prevention programs and automatic fire detection and extinguishing systems. Other occupations in which workers respond to emergencies include police officers and emergency medical technicians.

Sources of Additional Information

Information on obtaining a job as a firefighter is available from local civil service offices or fire departments.

Information about a career as a firefighter may be obtained from:

International Association of Fire Chiefs, 1329 18th St. NW., Washington, D.C. 20036.

International Association of Fire Fighters, 1750 New York Ave. NW., Washington, D.C. 20006.

Information about firefighter professional qualifications may be obtained from:

National Fire Protection Association, Batterymarch Park, Quincy, Mass. 02269.

Additional information on the salaries and hours of work of firefighters in various cities is published annually by the International City Management Association in its *Municipal Yearbook*, which is available in many libraries.

Guards

(D.O.T. 372.267 through -010; .563, .567-010, .667-010 and -030 through -038; and 376.667-010 and -018)

Nature of the Work

Guards patrol and inspect property to protect against fire, theft, vandalism, and illegal entry. Their duties vary with the size, type, and location of their employer.

In office buildings, banks, hospitals, and department stores, guards protect records, merchandise, money, and equipment. In department stores, they often work with undercover detectives watching for theft by customers or store employees.

At ports, airports, and railroads, guards protect merchandise being shipped as well as property and equipment. They insure that nothing is stolen while being loaded or unloaded, and watch for fires, prowlers, and trouble among work crews. Sometimes they direct traffic.

Guards who work in public buildings, such as museums or art galleries, protect paintings and exhibits. They also answer routine questions from visitors and sometimes guide traffic.

In factories, laboratories, government buildings, and military bases where valuable property or information must be protected, guards check the credentials of persons and vehicles entering and leaving the premises. University, park, or recreation guards perform similar duties and also may issue parking permits and direct traffic.

At social affairs, sports events, conventions, and other public gatherings, guards maintain order, give information, and watch for persons who may cause trouble.

In a large organization, a security officer often is in charge of the guard force; in a small organization, a single worker may be responsible for security. Patrolling usually is done on foot, but if the property is large, guards may make their rounds by car or motor scooter.

As they make their rounds, guards check all doors and windows, see that no unauthorized persons remain after working hours, and insure that fire extinguishers, alarms, sprinkler systems, furnaces, and various electrical and plumbing systems are working properly. They sometimes set thermostats or turn on lights for janitorial workers.

Guards usually are uniformed and often carry a nightstick and gun. They also may carry a flashlight, whistle, two-way radio, and a watch clock—a device that indicates the time at which they reach various checkpoints.

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Correction officers, guards who work in prisons and other correctional institutions, are discussed separately in this section of the *Handbook*.

Working Conditions

Guards work indoors and outdoors patrolling buildings, industrial plants, and grounds. Indoors, they may be stationed at a guard desk to monitor electronic security and surveillance devices or check the credentials of persons entering or leaving the premises. They also may be stationed at gate shelters or may patrol grounds in all weather.

Since guards often work alone, no one is nearby to help if an accident or injury occurs. Some large firms, therefore, use a reporting service that enables guards to be in constant contact with a central station outside the plant. If they fail to transmit an expected signal, the central station investigates. Guard work is usually routine, but guards must be constantly alert for threats to themselves and to the property that they are protecting. Guards who work during the day may have a great deal of contact with other employees and members of the public.

Many guards work alone at night; the usual shift lasts 8 hours. Some employers have three shifts where guards rotate to divide daytime, weekend, and holiday work equally. Guards usually eat on the job instead of taking a regular lunch break.

Employment

Guards held about 637,000 jobs in 1982. Industrial security firms and guard agencies employ about one-half of all guards. These organizations provide security services on contract, assigning their guards to buildings and other sites as needed. The other half were distributed across all other industries, with large numbers employed by banks; building management companies; hotels; hospitals; retail stores; restaurants and bars; schools, colleges, and universities; and Federal, State, and local governments.

Although guard jobs are found throughout the country, most are located in metropolitan areas.

Training, Other Qualifications, and Advancement

Most employers prefer guards who are high school graduates. Applicants with less than a high school education also can qualify if they pass reading and writing tests and demonstrate competence in following written and oral instructions. Some jobs require a driver's permit. Employers also seek people who have had experience in the military police or in State and local police departments. Most persons who enter guard jobs have prior work experience, although it is usually unrelated. Some have retired from military careers or other protective services, and guard employment is a second career.

Candidates for guard jobs in the Federal Government must have some experience as guards and pass a written examination. Armed Forces experience also is an asset. For most Federal guard positions, applicants must qualify in the use of firearms.

The amount of training guards receive varies. Many employers give newly hired guards instruction before they start the job and also provide several weeks of on-the-job training. Guards at nuclear power plants may undergo several months of training before being placed on duty under close supervision. Guards may be taught to use firearms, to administer first aid, to operate alarm systems and electronic security equipment, and to spot and deal with security problems. Some guards are periodically tested in the use of firearms.

Applicants are expected to have good character references, no police record, good health—especially in hearing and vision—and good personal habits such as neatness and dependability. They should be mentally alert and emotionally stable. Guards must be physically fit to cope with emergencies, and some guards are regularly tested for strength and endurance.

Although guards in small companies receive periodic salary increases, advancement is likely to be limited. However, most large organizations use a military type of ranking that offers advancement in position and salary. Guard experience enables some persons to transfer to police jobs that offer higher pay and greater opportunities for advancement. Guards with some college education may advance to jobs that involve administrative duties or the prevention of espionage and sabotage.

When patrolling alone, guards use 2-way radios to keep the security office informed of their location and activities.

Job Outlook

Job openings for persons seeking work as guards are expected to be plentiful through the mid-1990's. High turnover in this large occupation makes it rank among those providing the greatest number of job openings in the entire economy. Many opportunities are expected for persons seeking full-time employment, as well as for those seeking part-time or second jobs at night or on weekends. However, competition is expected for better paying positions.

Employment of guards is expected to grow faster than the average for all occupations through the mid-1990's. The level of business investment in plant and equipment—and security systems to protect them—has a major influence on how many guards will be required. Greater investment would cause greater growth in the number of guard jobs. Increased concern about crime and vandalism will also heighten the need for security in and around plants,

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stores, and recreation areas and is expected to cause growth of agency guard employment. While job growth will be concentrated in the guard and security agencies that provide guards on a contract basis, additional guards will be needed by banks, manufacturing plants, and Federal, State, and local governments to provide better security and monitor remote cameras, alarm systems, and other electronic surveillance equipment.

Guards employed by industrial security and guard agencies occasionally are laid off when the firm where they work does not renew its contract with their agency. Most are able to find employment with other agencies, however. Guards employed directly by the firm at which they work are seldom laid off because a plant or factory must still be protected even when economic conditions force it to close temporarily.

Earnings

Guards working in 23 urban areas averaged $4.98 an hour in 1982. Those working in the North Central States earned more than the average, while guards employed in the South earned somewhat less. Hourly wages of guards were estimated to average $8.62 in manufacturing; $8.57 in public utilities; $6.37 in banking, finance, insurance, and real estate; $6.33 in wholesale trade; $5.64 in retail trade; and $4.06 in the various service industries, including security and guard agencies. Guards with specialized training or some supervisory responsibilities averaged $7.16 an hour, while those with less training and responsibility averaged $4.68 an hour. Guards employed by industrial security and guard agencies generally started at the minimum wage, $3.35 an hour in 1982.

Depending on their experience, newly hired guards in the Federal Government earned between $10,300 and $11,600 a year in 1982. Guards employed by the Federal Government averaged $14,600 a year. These workers usually receive overtime pay as well as a wage differential for the second and third shifts. Many guards have paid vacations, sick leave, and insurance and pension plans.

Related Occupations

Guards protect property, maintain security, and enforce standards of conduct. Other related security and protective service occupations include: Bailiffs, border guards, correction officers, deputy sheriffs, fish and game wardens, house or store detectives, police officers, and private investigators.

Sources of Additional Information

Further information about work opportunities for guards is available from local employers and the nearest State employment service office.

Police and Detectives, Public Service

(D.O.T. 375.133-010 through .137-018, .137-026 through .167-022, .167-030 through -046, .263-010 through .363, .384, and .587; 377.117, .137 through .264, .267-010, and .667-018; and 379.263-014)

Nature of the Work

The safety of our Nation's cities, towns, and highways greatly depends on the work of police officers and sheriffs' deputies whose responsibilities range from controlling traffic to preventing and investigating crimes. Whether on or off duty, these officers are expected to exercise their authority whenever necessary.

Police officers and sheriffs' deputies who work in small communities and rural areas have many duties. In the course of a day's work, they 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 officers are detailed either to patrol or to traffic duty; smaller numbers are assigned to special work such as accident prevention or operation of communications systems. Others are 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.

Detectives and special agents are plainclothes investigators who gather facts and collect evidence for criminal cases. They conduct interviews, examine records, observe the activities of suspects, and participate in raids or arrests.

State police officers (sometimes called State troopers or highway patrol officers) patrol highways and enforce laws and regulations that govern their use. They 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 which may be used to determine 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 with mechanical trouble, direct tourists to their destination, or give information 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 during 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.

In addition to highway responsibilities, State police in the majority of States also enforce criminal laws. In communities and counties that do not have a local police force or a large sheriff's department, the State police are the primary law enforcement agency, investigating crimes such as burglary or assault. They also may help city or county police catch lawbreakers and control civil disturbances. State highway patrols, however, normally are restricted to apprehending criminals on State highways, and to vehicle safety and traffic matters.

Most new police recruits begin on patrol duty, riding in a police vehicle or walking on "foot" patrol. They may work alone or with other officers in such varied areas as congested business districts or outlying residential neighborhoods. In any case, new officers 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. Officers enforce traffic regulations and also watch for stolen automobiles. At regular intervals, officers report to police headquarters from call boxes, radios, or walkie-talkies.

Police officers and detectives also write reports and maintain police records. They may testify in court when their arrests result in legal action. Some officers, such as division or bureau chiefs, are responsible for training or investigation and those who command police operations in an assigned area have administrative and supervisory duties.

Working Conditions

Police officers usually work 40 hours a week. Because police protection must be provided around the clock in all but the smallest communities, some officers work weekends, holidays, and nights. Police officers are subject to call any time their services are needed and may work overtime during emergencies.

Police officers may have to work outdoors for long periods in all kinds of weather. The injury rate among police and detectives is higher than in many occupations and reflects the risks officers take in pursuing speeding motorists, apprehending criminals, and dealing with public disorders.

Employment

Police officers and detectives held nearly 550,000 jobs in 1982. Most were employed by local governments, primarily in cities with more than 25,000 inhabitants. Some cities have very large police forces while hundreds of small communities employ fewer than 25 officers each. State police and investigative agencies employed about 10 percent of the officers and

Police officers should enjoy working with people and serving the public.

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detectives, while various Federal agencies, such as the Federal Bureau of Investigation and the Secret Service, employed an additional 5 percent.

Training, Other Qualifications, and Advancement

Civil service regulations govern the appointment of police officers and detectives in practically all States and large cities and in many small ones. Candidates must be U.S. citizens, usually at least 21 years of age, and must meet rigorous physical and personal qualifications. Eligibility for appointment depends on performance in competitive written examinations as well as on education and experience. Physical examinations often include tests of vision, strength, and agility.

Because personal characteristics such as honesty, good judgment, and a sense of responsibility are especially important in police and detective 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 be given a personality test. Although police officers work independently, they must perform their duties in accordance with laws and departmental rules. They should enjoy working with people and serving the public.

In large police departments, where most jobs are found, applicants usually must have a high school education. An increasing number of cities require some college training and some hire law enforcement students as police interns. A few jobs, such as special agents for the Federal Bureau of Investigation or the Internal Revenue Service, require a college degree. A few police departments accept applicants 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 are encouraging applicants to take post-high school training in law enforcement. About half of all entrants to police and detective jobs have completed some formal postsecondary education; many are college graduates. Many junior colleges, colleges, and universities offer programs in law enforcement or administration of justice. Other courses helpful in preparing for a police career include psychology, counseling, English, American history, public administration, business law, chemistry, physics, and driver education. Physical education and sports are especially helpful in developing the stamina and agility needed for police work. A knowledge of Spanish is an asset in areas with large Spanish-speaking populations.

Some large cities hire high school graduates who are still in their teens as civilian police cadets or trainees. They do clerical work and attend classes and are appointed to the regular force at age 21 if qualified.

Before their first assignments, officers usually go through a period of training. In small communities, recruits work for a short time with experienced officers. In State and large city police departments, they get more formal training that may last several weeks or a few months. This training includes classroom instruction in constitutional law and civil rights, State laws and local ordinances, and accident investigation. Recruits also receive training and supervised experience in patrol, traffic control, use of firearms, self-defense, first aid, and handling emergencies.

Police officers usually become eligible for promotion after a probationary period ranging from 6 months to 3 years. In a large department, promotion may allow an officer to become a detective or specialize in one type of police work such as laboratory analysis of evidence, traffic control, communications, or working with juveniles. Promotions to sergeant, lieutenant, and captain usually are made according to a candidate's position on a promotion list, as determined by scores on a written examination and on-the-job performance.

Many types of training help police officers and detectives improve their job performance and advancement. Through training given at police department academies and colleges, officers keep abreast of crowd-control techniques, civil defense, legal developments that affect their work, and advances in law enforcement equipment. Many police departments offer higher salaries and pay all or part of the tuition for officers to work toward college associate and bachelor's degrees in law enforcement, police science, administration of justice, or public administration.

Job Outlook

Employment of police officers and detectives is expected to grow more slowly than the average for all occupations through the mid-1990's. Although the Nation's population and police protection needs will increase, slow growth in government revenues is expected to limit growth in police employment. Employment growth will also be tempered by increased use of civilian police department employees in parking enforcement and various clerical, administrative, and technical support positions. Although turnover of police and detective jobs is among the lowest of all occupations, the need to replace workers who retire, transfer to other occupations, or stop working for other reasons will be the source of most job openings.

Police work is attractive to many. The job frequently is challenging and involves much responsibility. Furthermore, in some communities, police officers may retire with a pension to pursue a second career before age 50. Although written examinations and strict physical requirements always eliminate many applicants, competition is expected to be keen for job openings through the mid-1990's. The outlook should be best for persons having some college training in law enforcement.

The level of government spending influences the employment of police officers and detectives. Layoffs are rare because early retirements enable most staffing cuts to be handled through attrition. However, police officers who lose their jobs from budget cuts usually have little difficulty finding jobs with other police departments.

Earnings

According to a 1982 survey by the International Personnel Management Association, police patrol officers had a median annual salary of $18,600. They started at an average of $16,400 a year and could reach an average maximum of more than $21,300 a year.

Police and detective sergeants had a median annual salary of $22,600 in 1982. They started at an average of $20,900 a year and could advance to an average maximum of $25,200 a year. Police and detective lieutenants had a median annual salary of $25,500 and started at an average of $23,300 a year. With experience and satisfactory job performance, they could advance to an average maximum salary of nearly $28,100 a year in 1982.

Police departments usually provide officers with special allowances for uniforms and furnish revolvers, night sticks, handcuffs, and other required equipment. Because police officers generally are covered by liberal pension plans, many retire at half pay after 20 or 25 years of service.

Related Occupations

Police officers maintain law and order in the Nation's cities, towns, and rural areas. Other related law enforcement occupations include guards, correction officers, fire marshals, and fish and game wardens.

Sources of Additional Information

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

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Food and Beverage Preparation and Service Occupations

This section of the *Handbook* deals with workers who prepare and serve food and beverages in restaurants, catering firms, hotels, clubs, bars, factories, school cafeterias, hospitals, rest homes, and other establishments that offer food and beverages. These workers cook and serve food, mix and serve drinks, and do many other related tasks. Since so many of these jobs involve dealing with the public, tact, courtesy, and a pleasant personality are important. The work is often hectic, and the ability to work efficiently under pressure while maintaining an even disposition and a sense of humor is necessary. Physical stamina is also very important, since most of these workers spend long periods of time on their feet and sometimes carry heavy loads of food and dishes.

Food and beverage preparation and service workers make up one of the largest occupational groups in the Nation's labor force. They accounted for over 6.2 million jobs in 1982—almost three times as many jobs as in the automobile and steel manufacturing industries combined. Part-time workers account for over one-half of total employment in these occupations. Vacation resorts employ these workers on a seasonal basis.

Job opportunities exist almost everywhere and for almost any interested person, including those who have limited skills or little formal education. The widespread availability of part-time jobs which easily fit into people's schedules makes these occupations attractive to students, homemakers, and others who want a job as a source of income rather than a career.

Skills usually are learned through on-the-job training. Many restaurants hire inexperienced persons as waiters' assistants, kitchen helpers, food counter workers, waiters and waitresses, or bartenders. Previous employment as a kitchen helper or assistant cook sometimes is necessary, however, to get a job in a large restaurant or catering firm. Also, courses in cooking, catering, and bartending offered by public and private vocational schools can be helpful. Experienced workers may advance to food service manager, maitre d'hotel, head cook, or chef. Completion of a college program in hotel and restaurant administration is valuable for the top managerial positions.

Starting pay for many of these jobs is very low. However, tips may add substantially to income.

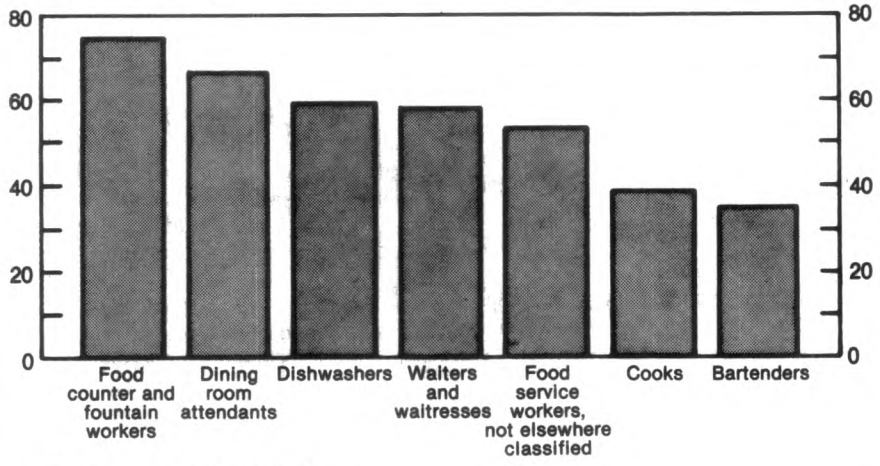
Although employment of these workers is expected to increase faster than the average for all occupations through the mid-1990's, the overwhelming majority of job openings are expected to result from replacement needs. A large proportion of food and beverage preparation and service workers transfer to other occupations or leave the labor force to assume household duties or return to school each year.

New jobs will be generated as additional restaurants, cafeterias, and bars open in response to population growth and increased spending for food and beverages outside the home. Higher average incomes and more leisure time will enable people to dine out and take vacations more often. Also, as more women work, more families may find dining out a welcome convenience.

Detailed discussions of the work, training, job outlook, and earnings of bartenders, cooks and chefs, and waiters and waitresses are presented in the statements that follow.

Part-time workers account for a large proportion of employment in food service occupations.

Percent employed part time, 1982



SOURCE: Bureau of Labor Statistics

Bartenders

(D.O.T. 312.474;.477; and .677)

Nature of the Work

At a moment's notice, a skillful bartender has prepared your drink. It may be a cool, sparkling glass of champagne or a colorful, exotic mixture such as a Singapore Sling. Bartenders make these concoctions by combining, in exact proportions, ingredients selected from what may seem to be a bewildering variety of alcoholic beverages, mixes, and garnish. A well-stocked bar contains dozens of types and brands of liquors, beer, and wines, plus soft drinks, fruits and fruit juices, cream, and soda and tonic water.

Bartenders fill the drink orders that waiters and waitresses serve customers seated in the restaurant or lounge, as well as orders from customers seated at the bar. Because some people like their cocktails made a certain way, bartenders often are asked to mix drinks to suit a customer's taste. Most bartenders must know dozens of drink recipes and be able to mix drinks, by sight alone, accurately, quickly, and without waste, even during the busiest periods. Besides mixing and serving drinks, bartenders collect payment, operate the cash register, clean up after customers have left, and may also serve limited food items or snacks to customers seated at the bar.

More operations, especially larger ones, are using equipment to automatically mix drinks of varying complexity at the push of a button. However, bartenders still must be efficient and knowledgeable to handle unusual orders and to work when the automatic equipment is not functioning; and equipment is no substitute for the friendly socializing most customers prefer.

Bartenders usually are responsible for ordering and maintaining an inventory of liquor, mixes, and other bar supplies. They also arrange the bottles and glassware into attractive displays and often wash glassware used at the bar.

Some bartenders own a tavern or bar and, therefore, also must keep their own business records and hire, train, and direct staff.

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A friendly bartender is greatly appreciated by customers.

Working Conditions

Many bartenders work more than 40 hours a week; and night and weekend work and split shifts are common. Better than average strength sometimes is necessary to lift heavy cases of liquors or mixes. Also, bartenders have to work quickly and under pressure in a popular bar during busy periods.

For many bartenders, however, the opportunity for friendly conversation with customers and the possibility of someday managing or owning a bar or restaurant more than offset these disadvantages. For others, the opportunity to get part-time work is important—for example, college students or other persons seeking supplemental income.

Employment

Seventy percent of the 384,000 jobs held by bartenders in 1982 were in restaurants and bars; about 20 percent were in hotels and private clubs. Most of the rest were in amusement and recreation establishments. More than 1 bartender in 9 was self-employed.

One out of every three bartenders works part time. Part-time work may involve bartending at banquets and private parties at restaurants, hotels, clubs, or even in private homes.

Seasonal employment is available in vacation resorts, and some bartenders migrate between summer and winter resorts rather than remain in one area the entire year.

Training, Other Qualifications, and Advancement

Most bartenders learn their trade on the job. Although preparing drinks at home can be good practice, it does not qualify a person to be a bartender. Besides knowing a variety of cocktail recipes, bartenders must know how to stock a bar properly and be familiar with State and local laws concerning the sale of alcoholic beverages.

Persons who wish to become bartenders can get good experience by working as bartenders' helpers, waiters' assistants, or waiters or waitresses. By watching a bartender at work, they can learn how to mix drinks and do other bartending tasks. However, one must practice to become proficient.

Some people acquire their skills by attending a bartending school or taking vocational and technical school courses that include instruction on State and local laws and regulations, cocktail recipes, attire and conduct, and stocking a bar. Some of these schools help their graduates find jobs.

Since they deal with the public, bartenders should have a pleasant personality and a neat and clean appearance. Physical stamina also is necessary, because they stand while working and may be required to lift heavy kegs of beer or cases of beverages. Some States require bartenders to have health certificates assuring that they are free of contagious diseases. In some instances, they must be bonded.

Generally, bartenders must be at least 21 years of age. Some employers prefer those who are 25 or older.

Small restaurants, neighborhood bars, and resorts usually offer a beginner the best opportunities. After gaining experience, a bartender may wish to work in a large restaurant or cocktail lounge where pay is higher and opportunities for promotion are greater. Although opportunities for promotion in this field are limited, it is possible to advance to head bartender, wine steward, or beverage manager. Some bartenders open their own businesses.

Job Outlook

Job opportunities for bartenders are expected to be plentiful. Because many bartenders are students, homemakers, or others who do not plan careers in this occupation, job turnover is very high. As a result, most job openings will arise from the need to replace bartenders who transfer to other occupations or stop working for a variety of reasons.

Employment of bartenders is expected to increase faster than the average for all occupations through the mid-1990's, as new restaurants, hotels, and bars open in response to population growth and as spending on food and beverages outside the home increases.

Earnings

In 1982, median annual earnings (excluding tips) of full-time bartenders were $10,200. The middle 50 percent earned from $8,100 to $13,500; the top 10 percent earned at least $15,800. Besides wages, bartenders may receive tips that substantially increase their earnings. Bartenders usually receive free meals at work and may be furnished bar jackets or complete uniforms.

Some large hotels require bartenders to be unionized. The principal union is the Hotel Employees Restaurant Employees International Union (AFL-CIO).

Related Occupations

Bartenders' duties include taking orders, serving drinks, and collecting payment from customers. Other workers who serve customers in a similar way include short-order cooks, food counter workers, and waiters and waitresses.

Sources of Additional Information

Information about job opportunities may be obtained from local employers and the local offices of the State employment service.

General information about bartenders is available from:

National Institute for the Foodservice Industry, 20 North Wacker Dr., Suite 2620, Chicago, Ill. 60606.

For a directory of colleges and other schools offering programs and courses in hospitality education, write to:

Council on Hotel, Restaurant, and Institutional Education, Henderson Human Development Building, Room 118, University Park, Pa. 16802.

Cooks and Chefs

(D.O.T. 313.281-010; .361-014 through -034; .381-014, -022, -030, -034; .671-010; 315.361-010, -018, -022; .371-010; and .381)

Nature of the Work

A reputation for serving fine food is an asset to any restaurant or hotel, whether it prides itself on "home cooking" or exotic foreign cuisine. Cooks and chefs are largely responsible for the reputation a restaurant acquires. Although the terms chef and cook are often used interchangeably, the professional chef generally is a far more skilled, trained, and experienced person. Many chefs have earned fame for both themselves and the restaurants and hotels where they work because of their skill in artfully preparing the traditional favorites and in creating new dishes and improving familiar ones.

A cook's duties depend partly on the size and kind of restaurant. Smaller restaurants usually feature a limited number of easy-to-prepare, short-order specialties and readymade desserts. Typically, one cook prepares all of the food with the help of a short-order cook and one or two kitchen helpers.

Large eating places usually have more varied menus and prepare, from start to finish, more of the food they serve. Kitchen staffs often include several cooks, sometimes called assistant or apprentice cooks, and many kitchen helpers. Each cook usually has a special assignment and often a special job title—pastry, fry, or sauce cook, for example. Head cooks or chefs coordinate the work of the kitchen staff and often direct certain kinds of food preparation. They decide the size of servings, sometimes plan menus, and buy food supplies.

Working Conditions

Many restaurant kitchens have modern equipment, convenient work areas, and air-conditioning; but others, particularly in older and smaller eating places, are frequently marginally equipped. Other variations in working conditions depend on the type and quantity of food being prepared and the local laws governing food service operations. In most kitchens, cooks must stand most of the time, lift heavy pots and kettles, and work near hot ovens and ranges. Hours in restaurants may include late evening, holiday, and weekend work, while hours in cafeterias, factories, or other institutions may be more regular. Cooks employed in public and private schools may work during the school year only, usually for 9 or 10 months.

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Vacation resorts offer seasonal employment for cooks and chefs.

Job hazards include falls, cuts, and burns, but injuries are seldom serious.

Employment

Cooks and chefs held over 1.2 million jobs in 1982. Over one-half worked in restaurants and over one-fifth worked in educational institutions; others worked in hotels and health-care institutions. Government agencies, factories, private clubs, and many other organizations also employed cooks and chefs.

Almost two-fifths of all cooks and chefs work part time, a larger proportion than in most occupations.

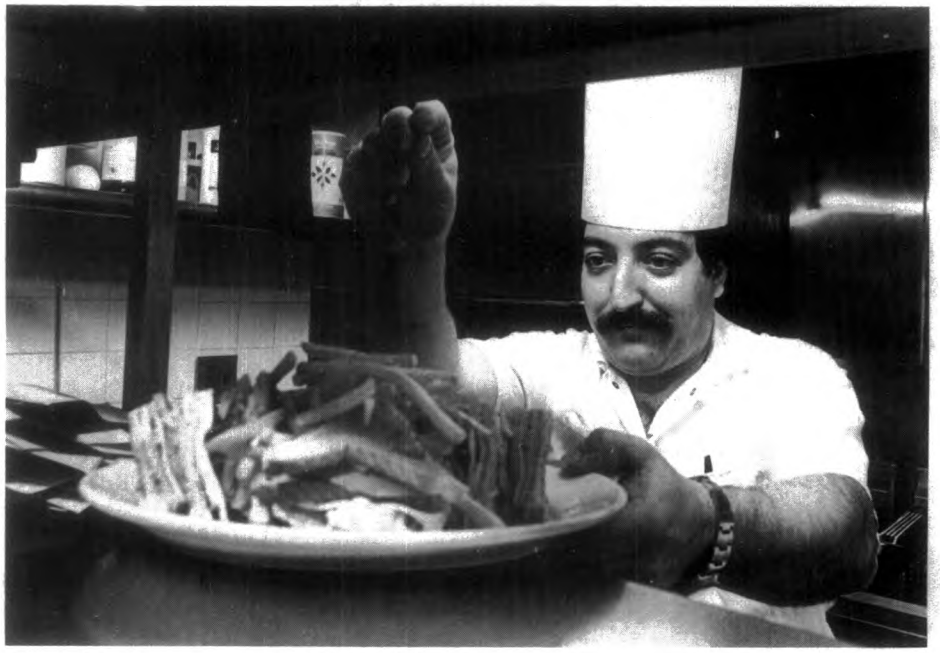
Training, Other Qualifications, and Advancement

Many cooks start work in an unskilled position such as kitchen helper and acquire their skills on the job; however, an increasing number are obtaining their training through high school or post-high school vocational programs, and 2- or 4-year colleges. Cooks may also be trained in apprenticeship programs offered by professional culinary institutes, industry associations, and trade unions. An example is the 3-year apprenticeship program administered by local chapters of the American Culinary Federation in cooperation with local employers and junior colleges or vocational education institutions. In addition, some large hotels and restaurants operate their own training programs for new employees.

Only a short period of training or experience is required to become an assistant or fry cook, but many years of training and experience are necessary to achieve the level of skill required of an executive chef or cook in a fine restaurant. Even though a high school diploma is not required for beginning jobs, it is recommended for those planning a career as a cook or chef. High school or vocational school courses in business arithmetic and business administration are particularly helpful. To get experience, high school students can work part time in fast-food or other restaurants.

Persons who have had courses in commercial food preparation will have an advantage when looking for jobs in large restaurants and hotels, where hiring standards often are high. Some vocational programs in high schools offer this kind of training. But usually these courses, which range from a few months to 2 years or more and are open in some cases only to high school graduates, are given by trade schools, vocational centers, colleges, professional associations, and trade unions. The Armed Forces also are a good source of training and experience.

Although curricula may vary, students usually spend most of their time learning to prepare food through actual practice. They learn to bake, broil, and otherwise prepare food, and to use and care for kitchen equipment. Training programs often include courses in menu planning, determination of portion size, food cost control, purchasing food supplies in quantity, selection and storage of food, and use of leftovers. Students also learn hotel and restaurant sanitation and public health rules for handling food. Training in supervisory and management skills sometimes is emphasized in courses offered by private vocational schools, professional associations, and university programs.



The cook is the mainstay of a food establishment.

Many school districts, in cooperation with school food services divisions of State departments of education, provide on-the-job training and sometimes summer workshops for cafeteria workers who wish to become cooks. Some junior colleges, State departments of education, and school associations also offer training programs. Cafeteria employees who have participated in these training programs often are selected for jobs as cooks.

Many persons accept jobs as cooks to earn supplemental income rather than begin a career. In fact, many entrants to this occupation are teen-age students and middle-age homemakers who primarily work part time. Relatively few people transfer into this occupation from other jobs.

Persons who want to become cooks or chefs should be able to work as part of a team and to withstand the pressure and strain of working in close quarters during busy periods. A keen sense of taste and smell, the physical stamina to stand for hours at a time, and personal cleanliness also are important qualifications. Most States require health certificates indicating that cooks and chefs are free from contagious diseases.

Advancement opportunities for cooks are better than for most other food and beverage preparation and service occupations. Many cooks acquire higher paying positions and new cooking skills by moving from one operation to another. Others gradually advance to chef positions or supervisory or management positions, particularly in hotels, clubs, or the larger, more elegant restaurants. Some eventually go into business as caterers or restaurant owners; others may become instructors in vocational programs in high schools, junior and community colleges, and other academic institutions.

Job Outlook

Job openings for cooks and chefs are expected to be plentiful. Most openings will arise from the need to replace large numbers of cooks and chefs who transfer to other occupations or stop working for a variety of reasons.

Employment of cooks and chefs is expected to increase faster than the average for all occupations through the mid-1990's. Contributing to demand will be population growth, higher family and personal incomes, and more leisure time that allow people to dine out and take vacations more often. Also, as more women join the work force, families increasingly may find dining out a welcome convenience.

Particularly fast growth in employment of cooks is expected in hospitals, nursing homes, residential care facilities, and other health-care institutions that serve the growing numbers of elderly people. While fast-food establishments will continue to increase, the trend towards restaurants that offer table service and fuller menus should spur demand for skilled cooks. Further, the increasing demand for more expensive restaurants that offer more exotic foods will require more highly skilled cooks and chefs.

Earnings

In 1982, median annual earnings of full-time cooks and chefs were $9,300. The middle 50 percent earned between $7,100 and $12,300; and the top 10 percent earned at least $16,400.

Wages of cooks and chefs vary depending on the part of the country and, especially, the type of establishment in which they work. Short-order cooks in fast-food establishments may be paid no more than the minimum wage. Wages generally are higher in large, well-known restaurants and hotels. Cooks and chefs in famous restaurants, of course, earn much more than the above salaries; those with national reputations

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earn $40,000 or more a year. Employers generally provide free meals and uniforms.

Some large hotels require cooks and chefs to be unionized. The principal union is the Hotel Employees Restaurant Employees International Union (AFL-CIO).

Related Occupations

Cooks and chefs may manage facilities ranging in size from a two-person sandwich shop to a large restaurant or hotel kitchen employing dozens of people. Other workers with similar management responsibilities include food service directors, executive housekeepers, and pursers. In addition, cooks and chefs in expensive restaurants create and then display a product to its best advantage. Other workers similarly involved include artists, bakers, clothes designers, and decorators.

Sources of Additional Information

Information about job opportunities may be obtained from local employers and local offices of the State employment service.

General information about restaurant cooks and chefs is available from:

National Institute for the Foodservice Industry, 20 North Wacker Dr., Suite 2620, Chicago, Ill. 60606.

For information on the American Culinary Federation's apprenticeship program for cooks, write to:

American Culinary Federation, P.O. Box 3466, St. Augustine, Fla. 32084.

For career information and a directory of accredited institutions offering programs in the culinary arts, write to:

National Association of Trade and Technical Schools, 2021 K St. NW., Washington D.C. 20006.

For a directory of colleges and other schools offering programs and courses in hospitality education, write to:

Council on Hotel, Restaurant, and Institutional Education, Henderson Human Development Building, Room 118, University Park, Pa. 16802.

Waiters and Waitresses

(D.O.T. 311.477-018 through -030; .674-018; 350.677-030; and 352.677-018)

Nature of the Work

Whether they work in small, informal diners or large, fancy restaurants, all waiters and waitresses have jobs that are essentially the same. They take customers' orders, serve food and beverages, make out checks, and sometimes take payments. The manner in which waiters and waitresses go about their work may vary considerably, however. In coffee shops, they are expected to provide fast, efficient service. In restaurants where meals are served elaborately and a great deal of emphasis is placed on the satisfaction and comfort of each guest, waiters and waitresses serve food at a more leisurely pace and offer more personal service to their customers. For example, they may suggest a certain kind of wine as a complement to a particular entree and may explain how items on the menu are prepared.

Depending on the type of restaurant, waiters and waitresses may perform duties other than waiting on tables. These tasks may include setting up and clearing tables and carrying soiled tableware to the kitchen. Although very small restaurants usually combine waiting on tables with counter service or cashiering, larger or more formal restaurants frequently relieve their waiters and waitresses of these additional duties.

Working Conditions

Some waiters and waitresses work split shifts—that is, they work for several hours during the middle of the day, take a few hours off in the afternoon, and then return to their jobs for the evening hours. Most are expected to work on holidays and weekends. The wide range in dining hours creates a good opportunity for flexible part-time work schedules attractive to students, homemakers, and others. Waiters and waitresses stand most of the time and often have to carry heavy trays of dishes and food. During dining hours, they may have to rush to serve several tables at once. The work is relatively safe, but they must be careful to avoid slips or falls and burns.

Employment

Waiters and waitresses held almost 1.7 million jobs in 1982. Four-fifths worked in restaurants; about 10 percent worked in hotels; and others worked in recreational, social, and other clubs. Jobs are located throughout the country but are most plentiful in large cities and tourist areas. Vacation resorts offer seasonal employment, and some waiters and waitresses alternate between summer and winter resorts instead of remaining in one area the entire year.

About 3 out of 5 waiters and waitresses work part time (less than 35 hours a week), a larger proportion than in almost any other occupation.

Training, Other Qualifications, and Advancement

Most waiters and waitresses pick up their skills on the job, learning to set tables, take orders from customers, and serve food in a courteous and efficient manner. Some advance to this job after working as a waiter's assistant, carhop, or food counter worker. Experience is preferred by the larger restaurants and hotels which also usually have higher educational standards than smaller, less formal establishments. Some public and private vocational schools, restaurant associations, and large restaurant chains provide classroom training in a generalized food service curriculum. Other employers use self-instruction programs to train new employees. In these programs, an employee learns

Successful waiters and waitresses offer good service and make people feel comfortable.

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food preparation and service skills by attending audiovisual presentations and reading instructional booklets.

A neat and clean appearance is important because waiters and waitresses are in close and constant contact with the public. An even disposition is also important since they must serve customers quickly and under pressure during busy periods. Physical stamina is necessary, as waiters and waitresses are on their feet for hours at a time, lifting and carrying trays of food from kitchen to table. Waiters and waitresses also should be good at arithmetic, if they have to total bills without the aid of a calculator. In restaurants specializing in foreign foods where some customers may not speak English, knowledge of a foreign language is helpful. State laws often require waiters and waitresses to obtain health certificates showing that they are free of contagious diseases.

For many persons, a job as a waiter or waitress serves as a source of income rather than a career. Many entrants to the occupation are in their late teens or early twenties and have a high school education or less. Usually, they have little or no work experience. Many are full-time students or homemakers.

Due to the small size of most food-serving establishments, opportunities for promotion are limited. After gaining some experience, however, a waiter or waitress may transfer to a larger restaurant where earnings and prospects for advancement are better. Successful waiters and waitresses genuinely like people, provide good service, and make customers feel comfortable. Advancement can be to supervisory jobs, such as host or hostess, maitre d'hotel, or dining room supervisor. Some supervisory workers advance to jobs as restaurant managers.

Job Outlook

Job openings for waiters and waitresses are expected to be plentiful through the mid-1990's. Most openings will arise from the need to replace the high proportion of waiters and waitresses who leave this very large occupation each year. There is substantial movement into and out of the occupation due to the limited formal education and training requirements and predominance of part-time jobs. Many waiters and waitresses simply move to other occupations; others stop working to assume household responsibilities or to attend school.

Employment of waiters and waitresses is expected to grow faster than the average for all occupations through the mid-1990's. Demand will stem from population growth, rising personal incomes, and increased leisure time which combined create more business for restaurants. Also, with more women joining the work force, families may increasingly find dining out a welcome convenience.

The best opportunities for employment will be in moderately priced restaurants. Because potential earnings are greatest in expensive restaurants, keen competition exists for the jobs that become available in these establishments.

Earnings

In 1982, median annual earnings (excluding tips) of full-time waiters and waitresses were $8,200. The middle 50 percent earned between $6,200 and $11,100; the top 10 percent earned at least $14,800. For many waiters and waitresses, however, tips are greater than hourly wages. Tips generally average between 10 and 20 percent of guests' checks. Most waiters and waitresses receive meals at work, and many are furnished with uniforms.

Some large hotels require waiters and waitresses to be unionized. The principal union is the Hotel Employees Restaurant Employees International Union (AFL-CIO).

Related Occupations

Other workers whose jobs involve serving customers and helping them feel at ease and enjoy themselves include flight attendants, butlers, counter workers, hosts and hostesses, and bellhops.

Sources of Additional Information

Information about job opportunities may be obtained from local employers and local offices of the State employment service.

General information on waiter and waitress jobs is available from:

National Institute for the Foodservice Industry, 20 North Wacker Dr., Suite 2620, Chicago, Ill. 60606.

For a directory of colleges and schools offering programs and courses in hospitality education, write to:

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These workers assist health professionals such as physicians, dentists, optometrists, nurses, and therapists. They typically perform routine but essential tasks that involve a great deal of personal contact: Conversing with patients, making them comfortable, and setting them at ease. Depending on their place of work, health service workers might make appointments, greet patients, keep records, set up equipment, deliver food trays, change bed linen, transport patients, help them do exercises, and escort those who cannot walk unassisted.

Little formal training is required, although some workers prepare by completing 1- or 2-year programs offered by community colleges, vocational-technical insititutes, and trade schools. Employers generally provide all the necessary training on the job. While high school graduates are preferred, employers do not always insist on a diploma. More important are the personal traits these jobs require: Dependability, common sense, emotional stability, a cheerful disposition, and willingness to assume responsibility. A fair amount of physical effort is involved, and at times the work is strenuous and tiring.

Nursing aides, orderlies, and attendants make up the largest of these occupations; they held more than 1.2 million jobs in 1982. Much of their workday is spent answering patients' bell calls, delivering and collecting food trays, feeding patients, and relieving the nursing staff of other routine tasks. *Psychiatric aides* held about 132,000 jobs in 1982. Most work in mental hospitals, where they help patients with bathing, dressing, grooming, and meals. *Ambulance drivers* and *ambulance attendants* also provide essential services.

There were an estimated 300,000 medical or dental assisting jobs in 1982. Assistants usually work in the office of a practitioner, and handle a combination of office and patient-care duties. *Optometric assistants* and *ophthalmic medical assistants*, for example, maintain records, give preliminary eye examinations and help patients do prescribed exercises. *Dental assistants* held 153,000 jobs in 1982 and *medical assistants* held 100,000 jobs. (Medical assistants should not be confused with physician assistants, highly skilled health professionals who undergo several years of rigorous training to acquire their skill in patient care. Their work is described elsewhere in the *Handbook*.) Other assisting jobs include those of *chiropractor assistant* and *podiatric assistant*.

Physical therapists and occupational therapists also work with the support of *assistants* and *aides*. The different job titles reflect different levels of training and expertise. Assistants have more formal preparation than aides; many are graduates of 2-year associate degree programs. Assistants help the therapist test patients and administer treatments. Aides are less directly involved in diagnosis and treatment. Instead, they help patients dress and undress, organize and maintain the equipment, make appointments, and perform other clerical duties.

Employment in most of these occupations is expected to grow faster than the average for all occupations through the mid-1990's. This reflects anticipated demand for health care services on the part of a growing and longer-living population, and continued emphasis on using support personnel to increase the productivity of highly trained practitioners. Most job openings, however, will result from replacement needs, which will continue to be substantial. Turnover in these occupations tends to be very high, in part because entry requirements are minimal and pay scales are low. Growth rates and job prospects are not the same for all the health service occupations; see the *Handbook* statements that follow for information on specific occupations.

Dental Assistants

(D.O.T. 079.371-010)

Nature of the Work

Dental assistants, or "chairside dental assistants," work with dentists as they examine and treat patients. The assistant makes the patients comfortable in the dental chair, prepares them for treatment, and obtains their dental records. The assistant hands the dentist the proper instruments and materials and keeps the patient's mouth clear by using suction or other devices. Dental assistants prepare materials for making impressions and restorations, and expose radiographs and process dental X-ray film as directed by the dentist. They sterilize and disinfect instruments and equipment; prepare tray set-ups for dental procedures; provide post-operative instruction; and instruct patients in oral health practices.

Dental assistants may perform a variety of laboratory, clinical, and office duties; some make casts of the teeth and mouth from impressions taken by the dentist. In some States, assistants apply medications to the teeth and oral tissue, remove excess cement used in the filling process, and place rubber dams on the teeth to isolate them for individual treatment. In small, single-dentist practices, dental assistants may manage the office and arrange and confirm appointments, receive patients, keep treatment records, send bills, receive payments, and order dental supplies and materials.

The work of the dental assistant should not be confused with that of the dental hygienist, who must be licensed to scale and polish teeth. (See the statement on dental hygienists elsewhere in the *Handbook*.)

Working Conditions

Dental assistants work in a well-lighted, clean environment. They must be careful in handling radiographic equipment; the occupation is one of several covered by the Consumer-Patient Radiation Health and Safety Act of 1981, which encourages the States to adopt uniform standards for the training and certification of individuals who perform medical and dental radiologic procedures.

Dental assistants, like dentists, work in either a standing or sitting position. Their work area is near the dental chair, so that they can arrange instruments, materials, and medication, and hand them to the dentist when needed. They must be a dentist's "third hand," and, therefore, should exhibit some manual dexterity and be able to deal with people who may be under stress.

Although the 40-hour workweek prevails for dental assistants, the schedule is likely to include work on Saturday.

Employment

Dental assistants held about 153,000 jobs in 1982. About 1 out of 4 worked part time, sometimes in more than one dentist's office.

Most dental assistants work in private dental offices, either for individual dentists or for groups of dentists. Others work in dental schools, hospital dental departments, State and local public health departments, or private clinics. The Federal Government employs dental assistants in hospitals and dental clinics of the U.S. Public Health Service and the Veterans Administration.

Training, Other Qualifications, and Advancement

Dental assisting is an entry level job; the principal requirements are a congenial personality and the ability to learn the job. Consequently, entrants to this occupation tend to be young; for many, it is their first experience in the world of work.

Many dental assistants learn their skills on the job. Some, however, are trained in dental assisting programs offered by community and junior colleges, trade schools, and technical institutes. About 290 such programs were accredited by the Commission on Dental Accreditation in 1982. More than three-fourths of the programs take 1 year to complete and lead to a certificate or diploma. Graduates of 2-year programs offered in community and junior colleges earn an associate degree. The minimum

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The assistant's use of dental X-ray equipment is regulated by law in a number of States

requirement for any of these programs is a high school diploma or its equivalent. Some schools require typing or a science course for admission. Some private vocational schools offer 4- to 6-month courses in dental assisting, but these are not accredited by the dental profession. Those receiving dental assistant training in the Armed Forces usually qualify for civilian jobs as dental assistants.

High school students interested in careers as dental assistants should take courses in biology, chemistry, health, typing, and office practices.

Accredited dental assisting programs include classroom, laboratory, and preclinical instruction in dental assisting skills and related theory. In addition, students gain practical experience in affiliated dental schools, local clinics, or selected dental offices.

A correspondence course offered by the University of North Carolina School of Dentistry is among those programs accredited by the Commission on Dental Accreditation. This course is available for employed dental assistants who are learning on the job or who otherwise are unable to participate in accredited training programs on a full-time basis. The correspondence program is equivalent to 1 academic year of study but generally requires about 2 years to complete.

Certification is available through the Dental Assisting National Board; it is an acknowledgment of an assistant's qualifications but is not generally required for employment.

Twenty-one States require dental assistants to complete specified training and/or an examination before performing dental X-rays under a dentist's supervision; the remaining States have no training or examination requirements for dental radiography.

After working as dental assistants, some individuals seek to acquire the skills and qualifications for practicing as dental hygienists. Prospective dental assistants who foresee this possibility should plan carefully, since credit earned in a dental assistant program often is not applicable toward requirements for a dental hygiene certificate. Some dental assistants become sales representatives for firms that manufacture dental products. The field of dental assisting education offers opportunities in teaching and program administration.

Job Outlook

Employment of dental assistants is expected to grow faster than the average for all occupations through the mid-1990's, reflecting dentists' interest in improving their productivity as well as increased demand for dental care. An increase in demand for dental care is expected because of population growth, rising real incomes, and participation in dental prepayment plans. When they delegate routine tasks to dental assistants, dentists with a large enough practice can use their time for more remunerative procedures. Nonetheless, if the rapidly rising supply of dentists causes a decline in dentists' patient load, they may choose to perform more functions themseleves and hire fewer assistants. Employment growth would then be slower than currently expected.

Most job openings will be created by the need to replace assistants who leave the occupation. Since dental assisting offers relatively low pay and limited advancement, a large proportion of dental assistants leave the occupation annually, thus creating openings for others. This is largely an occupation of young women, and many of them leave the job to take on family responsibilities. Others return to school. Very few leave for retirement or disability.

Earnings

Salary depends largely on the duties and responsibilities attached to the particular job and on geographic location. Dentists' policies with respect to assistants' salaries vary widely, but there is little evidence that individuals who have completed a formal training program in dental assisting command higher pay.

In 1982, median earnings for dental assistants working full time were about $200 a week. The middle 50 percent earned between $170 and $250 a week. The lowest 10 percent earned less than $150 a week, the highest 10 percent, more than $300.

In the Federal Government, experience and the amount and type of education determine starting salaries. In 1982, a high school graduate who had 6 months of experience started at about $10,600 a year; graduates of a 1-year accredited dental assisting program who had a year of general experience could expect to start at nearly $12,000 a year. Dental assistants working for the Federal Government earned average salaries of about $13,700 in 1982.

Related Occupations

Dental assistants perform a variety of duties that do not require the dentist's professional knowledge and skill. Other workers who provide similar services under the supervision of a health practitioner include medical assistants, chiropractor assistants, optometric assistants, podiatric assistants, and surgical technicians.

Sources of Additional Information

Information about career opportunities, scholarships, accredited dental assistant programs, including the correspondence program, and requirements for certification is available from:

American Dental Assistants Association, 666 N. Lake Shore Dr., Suite 1130, Chicago, Ill. 60611.

Commission on Dental Accreditation, American Dental Association, 211 E. Chicago Ave., Suite 1814, Chicago, Ill. 60611.

Dental Assisting National Board, Inc., 666 N. Lake Shore Dr., Suite 1136, Chicago, Ill. 60611.

Medical Assistants

(D.O.T. 079.367-010)

Nature of the Work

Medical assistants help physicians examine and treat patients and perform most of the administrative tasks needed to keep an office running smoothly.

The duties of medical assistants, who sometimes are called *medical office assistants*, consist of administrative and clinical activities. The size of the office in which the medical assistant works determines the scope of the job: Those in small offices typically handle both clerical and clinical duties, whereas in offices with a sizable staff, medical assistants usually specialize in either the "office" or "patient care" aspects of the job.

Clinical duties most commonly include: Recording patients' height, weight, temperature, and blood pressure; obtaining medical histories; performing basic laboratory tests; preparing patients for examination or treatment; assisting the physician examine patients;

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and sterilizing instruments. Other clinical duties may be instructing patients about medication and self-treatment, drawing blood, taking X-rays and EKG's, and applying dressings.

Medical assistants also may arrange instruments and equipment in the examining room; check office and laboratory supplies; and maintain the waiting, consulting, and examination rooms in a neat and orderly condition.

Medical assistants perform a variety of administrative duties. They may answer the telephone, greet patients and other callers, record and file patient data and medical records, fill out medical reports and insurance forms, handle correspondence, schedule appointments, and arrange for hospital admission and laboratory services. Along with other office duties, they may transcribe dictation and handle the bookkeeping and billing. Medical secretaries and medical receptionists also perform administrative tasks in medical offices, but, unlike medical assistants, they rarely have clinical duties. (See the statements on receptionists and on secretaries and stenographers elsewhere in the *Handbook*.)

Working Conditions

Medical assistants work in a well-lighted, clean environment.

Employment

Medical assistants held about 100,000 jobs in 1982. Most jobs were in the offices of physicians and other health practitioners, including optometrists, podiatrists, and chiropractors. The remaining jobs were in hospitals, clinics, health maintenance organizations, and other facilities. The following tabulation shows the distribution of wage and salary jobs in 1982:

	Percent
Total	100.0
Offices of physicians (M.D.'s and D.O.'s)	77.0
Offices of other health practitioners	7.8
Hospitals	5.4
Outpatient care facilities	3.8
All other	6.0

Training, Other Qualifications, and Advancement

Medical assistants generally are trained on the job. Applicants usually need a high school diploma or the equivalent. High school courses in mathematics, health, biology, typing, bookkeeping, computers, and office practices are helpful.

Many medical assistants receive their training in formal programs offered in some high schools and, at the postsecondary level, by vocational-technical institutes, trade schools, and community and junior colleges.

Community college programs in medical assisting usually last 2 years and lead to an associate degree; the other programs take up to 1 year to complete and graduates receive a diploma. Approximately 23,000 persons completed medical assisting programs in 1980, but the number seeking work as medical assistants was smaller than this. Every year, many who complete the program take other kinds of jobs; some undertake additional training in nursing, radiologic technology, medical laboratory technology, or other allied health fields.

Two agencies are recognized by the U.S. Department of Education to accredit programs in medical assisting: The Committee on Allied Health Education and Accreditation (CAHEA) and the Accrediting Bureau for Health Education Schools (ABHES). The 167 programs currently approved by CAHEA graduated about 5,600 students in 1982. The ABHES currently accredits 103 programs, and graduates numbered about 4,700 in 1982. The curriculum in these programs consists of courses in biology, anatomy and physiology, typing, transcription, accounting, records and recordkeeping, and medical terminology. Many students receive instruction in computer skills as they apply to the medical office. Students also receive supervised clinical experience and learn laboratory techniques, use of medical equipment, clinical procedures, and first-aid techniques. In addition, students receive instruction in administrative and office practices including communications skills, human relations, and medical law and ethics.

There are no licensing requirements for medical assistants. Credentialing, which is voluntary, consists of certification or registration offered by two organizations upon successful completion of an examination. The American Association of Medical Assistants (AAMA) awards the Certified Medical Assistant (CMA) credential, and the American Medical Technologists awards the Registered Medical Assistant (RMA) credential.

For medical assistants, advancement generally means leaving the occupation, for career lines are short. Clinical health occupations such as radiologic technologist or registered nurse require additional education, whereas administrative and managerial jobs may not. Medical assistants who demonstrate leadership abilities may, for example, be promoted to the position of office manager. (The trend toward group practice, clinics, free-standing emergency centers, and other alternatives to solo practice is likely to heighten demand for office managers.) Medical assistants with computer skills are qualified for a wide variety of research and management support positions.

A neat, well-groomed appearance and a courteous, pleasant manner are necessary traits for medical assistants, who have a great deal of contact with the public. Communication skills are especially important. Medical assistants must not only be good at putting patients at ease, but be good listeners and interpret a physician's instructions correctly the first time they are given. Conscientiousness, a sense of responsibility, and respect for the confidential nature of medical information are all necessary qualities in a medical assistant. Clinical duties require a reasonable level of manual dexterity and visual acuity. Medical assistants must be able to deal with people who are under stress.

Job Outlook

Employment of medical assistants is expected to grow faster than the average for all occupations through the mid-1990's because of the projected rapid increase in the number of physicians in practice. The growing complexity and sheer volume of the paperwork associated with medical care also will spur demand. Most job openings, however, will result from the need to replace experienced assistants who leave the occupation.

Medical assistants help maintain the records in physicians' offices.

In view of the preference of many physicians for trained personnel, job prospects should be very good for medical assistants with formal training, experience, or both.

Earnings

The earnings of medical assistants vary widely. The assistant's qualifications and experience and the size and location of the physician's practice all help to determine the level of pay. From the limited information available, inexperienced medical assistants generally start at about $8,000 a year. Medical assistants with 5 years of experience usually earn about $15,000 a year.

Although medical assistants usually work 40 hours a week, some work on Saturday may be required.

Related Occupations

Other health occupations that entail a combination of administrative and clinical duties and require only a limited amount of specialized training include pharmacy helpers, dental assistants, optometric assistants, podiatric assistants, occupational therapy aides, and physical therapist aides.

Sources of Additional Information

Information about career opportunities, CAHEA-accredited educational programs in medical assisting, and requirements for the CMA exam is available from:

The American Association of Medical Assistants, 20 North Wacker Dr., Suite 1575, Chicago, Ill. 60606.

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Information about career opportunities and requirements to become an RMA are available from:

American Medical Technologists, Registered Medical Assistants, 710 Higgins Rd., Park Ridge, Ill. 60068.

For a list of ABHES-approved educational programs in medical assisting, write:

Accrediting Bureau of Health Education Schools, Oak Manor Office, 29089 U.S. 20 West, Elkhart, Ind. 46514.

A list of accredited and nonaccredited postsecondary programs in medical assisting, arranged by State, may be found in *Postsecondary Schools with Occupational Programs, 1982*, a publication of the U.S. Department of Education's National Center for Education Statistics. This publication and similar directories put out by commercial publishers may be available in counseling centers or large public libraries.

Nursing Aides, Orderlies, and Attendants

(D.O.T. 354.374-010 and .377-010; 355.674-014 and 018)

Nature of the Work

Nursing aides, orderlies, and attendants help care for people who are sick, disabled, or infirm. Job titles vary; in some places, these workers are known as *nursing assistants, hospital attendants, birth attendants*, and *geriatric aides*.

The duties of nursing aides, orderlies, and attendants depend on the policies of the institutions where they work, the type of patient being cared for, and—equally important—the worker's skill level and capacity for independent judgment. These workers care for hospital and nursing home patients, for the most part. Typical duties oab02f a nursing aide include answering patients' bell calls and delivering messages, serving meals, feeding patients who are unable to feed themselves, making beds, and bathing and dressing patients. Aides also may give massages, take temperatures, and assist patients in getting out of bed and walking. In some hospitals, nursing aides may clean patients' rooms and do similar housekeeping tasks. In others, they may help registered nurses and licensed practical nurses care for patients. The work depends on whether the patient is confined to bed after major surgery, is recovering after a disabling accident or illness, or needs assistance in daily activities because of advanced age.

Orderlies escort patients to operating and examining rooms and transport and set up heavy equipment. Attendants may store and move supplies in hospital pharmacies or supply rooms.

Examples of workers who perform similar tasks in other settings are *homemaker-home health aides, home health aides*, and *psychiatric aides*. They are not covered in this statement, however.

Working Conditions

With few exceptions, the scheduled workweek of attendants in hospitals is 40 hours or less. Because patients need care 24 hours a day, scheduled work hours include nights, weekends, and holidays. Workers spend many hours standing and may have to move patients in bed or help them stand or walk.

Nursing aides often empty bed pans, change soiled bed linens, and care for disoriented and irritable patients. Many gain personal satisfaction, however, from assisting those in need.

Employment

Nursing aides, orderlies, and attendants held about 1,218,000 jobs in 1982. Most wage and salary jobs were in hospitals or nursing homes, as the accompanying chart shows.

About a quarter of all nursing aide, orderly, and attendant jobs are part time.

Training, Other Qualifications, and Advancement

These are entry level jobs that do not ordinarily require work experience. Educational requirements are minimal. Although employers prefer high school graduates, many, such as Veterans Administration hospitals, do not require a high school diploma. Employers often accept applicants who are 17 or 18 years of age.

In addition to providing young people with an entry to the world of work, these occupations offer good opportunities for middle-aged and older women seeking to reenter the labor force after attending to family responsibilities. Many in this group do not have a high school diploma.

The fact that personal qualifications such as warmth, dependability, and levelheadedness outweigh formal educational requirements is a distinctive feature of the nursing assistant occupations. However, hiring requirements are beginning to change in the direction of more formal preparation.

In many States, nursing aides must be certified. To receive certification, they must pass an approved course of instruction from a State-approved school. These courses, which range in length from 65 to 240 hours, are offered in high schools, vocational education schools, and schools affiliated with nursing homes. Subjects taught include body mechanics, nutrition, anatomy and physiology, infection control, and communications skills.

In States which do not require certification, nursing aides generally are trained after they are hired. Some institutions combine on-the-job training, under registered nurses or licensed practical nurses, with classroom instruction. Trainees learn to take and record temperatures, bathe patients, change linens on beds occupied

Assisting at mealtime is an important part of a nursing aide's job.

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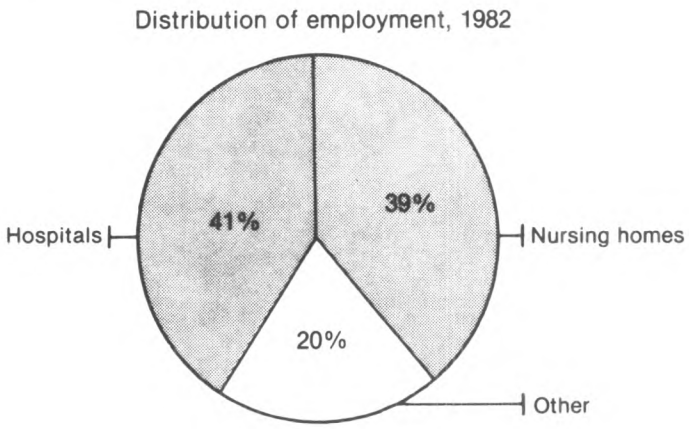
Nursing homes provide nearly as many jobs as hospitals for nursing aides, orderlies, and attendants.



SOURCE: Bureau of Labor Statistics

by patients, and move and lift patients. Training may last several days or a few months, depending on the policies of the institution, the complexity of the duties, and the aide's aptitude for the work.

Courses in home nursing and first aid, offered by many public school systems and other community agencies, provide a useful background of knowledge for the work. Volunteer work and temporary summer jobs in hospitals and similar institutions also are helpful. Applicants should be healthy, tactful, patient, understanding, emotionally stable, and dependable. Nursing aides, as other health workers, should have a genuine desire to help people, be able to work as part of a team, and be willing to perform repetitive, routine tasks.

Opportunities for advancement within these occupations are limited. Career ladders, where they exist at all, are very short. Nonetheless, the large and rapidly growing health industry—which comprises hundreds of occupations and employment settings—offers excellent opportunities for aides, orderlies, and assistants who are suitable candidates for additional training. Experience in the health care system almost invariably is an asset when applying for formal training, which is offered by community colleges, vocational-technical institutes, and trade schools. Hospital occupations requiring approximately 1 year of training beyond high school include surgical technician, licensed practical nurse, EEG technologist, EKG technologist, respiratory therapy technician, clinical laboratory assistant, and dietetic technician. Many of these are discussed elsewhere in the *Handbook*.

Job Outlook

Job prospects for nursing aides, orderlies, and attendants are expected to be good through the mid-1990's due to the widespread availability of jobs and the relative ease of entry into the occupation. Growth in demand for these workers and the need to replace experienced workers who leave their jobs will create far more openings than in most other occupations.

Employment is expected to grow faster than the average for all occupations in response to the health care needs of a growing and aging population. Opportunities are expected to be especially favorable in nursing homes and other long-term care facilities, due to the very rapid growth projected for services for the disabled and the elderly. Employment of these workers is projected to grow more slowly in hospitals than in nursing homes through the mid-1990's. Nevertheless, hospitals employ so many nursing aides, orderlies, and attendants that a substantial proportion of openings will continue to be in the hospital sector.

Replacement needs constitute the major source of openings. Turnover in these occupations, as in other service occupations, is high, a reflection of relatively low skill requirements and low pay.

Earnings

Median annual earnings of nursing aides, orderlies, and attendants who worked full time in 1982 were about $9,000. The middle 50 percent earned between $8,000 and $12,000. The lowest 10 percent earned about $6,000 or less. The top 10 percent earned $15,000 or more.

Nursing aides, orderlies, and attendants earned salaries that were below the average for all nonsupervisory workers in private industry, except farming. Nursing aides employed full time by nursing homes and related facilities earned less than those in hospitals. For example, according to surveys conducted by the Bureau of Labor Statistics, nursing aides employed full time in nursing homes in large metropolitan areas earned annual average salaries ranging from $8,000 to $14,000 in 1982. Full-time nursing aides in hospitals in large metropolitan areas earned from $10,000 to $18,000. In 1982, Federal hospitals paid inexperienced nursing aides who were high school graduates annual salaries of $9,756. Nursing aides with a year of experience received $10,645, while those with 2 years received $11,949. The average salary of nursing aides employed by the Federal Goverment was about $14,000 a year in 1982.

Attendants in hospitals and similar institutions generally receive at least 1 week's paid vacation after 1 year of service. Paid holidays and sick leave, hospital and medical benefits, extra pay for late-shift work, and pension plans also are available to many hospital employees.

Related Occupations

Nursing aides, orderlies, and attendants help with the care and treatment of people who are sick, disabled, or infirm. They may move and assemble heavy equipment and perform housekeeping chores. Workers with similar duties include homemaker-home health aides, psychiatric aides, child care attendants, companions, occupational therapy aides, physical therapy aides, caretakers, and central supply workers.

Sources of Additional Information

For information on nursing careers in hospitals, contact:

American Hospital Association, Division of Nursing, 840 North Lake Shore Dr., Chicago, Ill. 60611.

For a copy of *Health Careers in Long-Term Care*, write:

American Health Care Association, 1200 15th St. NW., Washington, D.C. 20005.

Information about employment also may be obtained from local hospitals and nursing homes.

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Cleaning and Building Service Occupations

Every public building, office, and apartment house needs to be kept clean and in good condition for the comfort and safety of the people who work or live there. This work is done by people in cleaning and building service occupations, who clean, do routine maintenance and repair, replenish supplies, operate elevators, or exterminate insects and rodents.

Workers who have limited skills or little education can often find jobs in this field. Skills usually are learned on the job, but other training sometimes is available. Building custodians, for example, may attend training programs offered by unions and government agencies. Maids and housekeepers may take homestudy or classroom courses in housekeeping procedures offered by their employer. Workers who learn their jobs thoroughly and show that they can handle responsibility may advance to supervisory positions.

Besides a knowledge of their job, these workers must be courteous, tactful, and neat if their job requires contact with the public. They should be able to follow instructions and work well on their own. Some of these workers perform repetitive and tiring tasks, such as scrubbing and waxing floors or making up beds, and must be able to tolerate the boredom of the job.

Starting pay for most cleaning and building service workers is relatively low.

Employment of these workers should increase as additional hotels, office buildings, and other structures that require cleaning and maintenance are built. Job turnover is high in these occupations. Thus, besides jobs created by increased demand for cleaning and building services, many job openings will occur each year as workers transfer to other occupations, leave their jobs for personal reasons, retire, or die.

Building Custodians

(D.O.T. 187.167-190; 381.137-010, .687-014, -018, -022; 382.664-010; and 891.137-010)

Nature of the Work

Building custodians, also called janitors or cleaners, keep office buildings, hospitals, stores, apartment houses, and other types of buildings clean and in good condition. Some custodians only do cleanings, others have a wide range of duties. They may fix leaky faucets, empty trash cans, do painting and carpentry, replenish bathroom supplies, mow lawns, and see that heating and air-conditioning equipment works properly. On a typical day, custodians may wet- or dry-mop floors, vacuum carpets, dust furniture, make minor repairs, and exterminate insects and rodents.

Custodians use many different tools and cleaning materials. For one job they may need a mop and bucket; for another, an electric polishing machine and a special cleaning solution. Chemical cleaners and power equipment have made many tasks easier and less time consuming, but custodians must know how to use them properly to avoid harming floors and fixtures.

Some custodians supervise a group of custodial workers and are responsible for maintaining a section of a building or an entire building. They assign tasks to each worker, give instructions, and see that jobs, such as floor waxing or window washing, are done well.

Working Conditions

Because most office buildings are cleaned while they are empty, custodians may work evening hours. Some, however, such as school custodians, work in the daytime. In buildings requiring 24-hour maintenance, custodians may work on shifts.

Although custodians usually work inside heated, well-lighted buildings, they sometimes work outdoors sweeping walkways, mowing lawns, or shoveling snow. Working with machines can be noisy and some tasks, such as cleaning bathrooms and trash rooms, can be dirty and unpleasant. Custodial workers may suffer minor cuts, bruises, and burns from machines, handtools, and chemicals.

Building custodians spend most of their time on their feet, sometimes lifting or pushing heavy furniture or equipment. Many tasks, such as dusting or sweeping, require constant bending, stooping, and stretching.

Employment

Building custodians held almost 2.8 million jobs in 1982. One-third worked part time (less than 35 hours a week).

Custodians worked in every type of establishment. About 1 in 5 worked in a school, including colleges and universities. One in 10 worked in a hotel and another 1 in 10 in a hospital or nursing home. One in 7 worked for a firm supplying building maintenance services on a contract basis. Others were employed by restaurants, operators of apartment buildings and other types of real estate, churches and other religious organizations, manufacturing firms, and government agencies.

Although custodial jobs can be found in all cities and towns, most are located in highly populated areas where there are many office buildings, stores, and apartment houses.

Training, Other Qualifications, and Advancement

No special education is required for most custodial jobs, but the beginner should know simple arithmetic and be able to follow instructions. High school shop courses are helpful for minor plumbing or carpentry work.

Most building custodians learn their skills on the job. Usually, beginners do routine cleaning and are given more complicated duties as they gain experience.

In some cities, programs run by unions, government agencies, or employers teach custodial skills. Students learn how to clean buildings thoroughly and efficiently, and how to operate and maintain machines used on the job, such as wet and dry vacuums, buffers, and polishers. Instruction in minor electrical, plumbing, and other repairs may also be given. As part of their training, students learn to plan their work, to follow safety and health regulations, to deal with people in the buildings they clean, and to work without supervision.

Building custodians usually find work by answering newspaper advertisements or applying directly to a company where they would like to work or to a building maintenance service. They also get jobs through State employment offices. Custodial jobs in the government are obtained by applying to the civil service personnel headquarters.

Advancement opportunities for custodial workers usually are limited because in many buildings, the custodian is the only maintenance worker. Where there is a large maintenance staff, however, custodians can be promoted to supervisory jobs. A high school

Custodians use many different machines and cleaning materials.

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diploma improves the chances for advancement. Some custodians go into the maintenance business for themselves.

Job Outlook

Employment of building custodians is expected to grow about as fast as the average for all occupations through the mid-1990's as the number of office buildings, factories, hospitals, and apartment houses, schools, and other buildings increases. However, the need to replace workers who transfer to other occupations or leave the labor force will create most job openings. Persons seeking part-time or evening work can expect to find many opportunities.

Earnings

Custodians who usually worked full time averaged $210 a week in 1982; the middle 50 percent earned between $160 and $255. Ten percent earned less than $145, 10 percent more than $350.

In 1982, average straight-time earnings of building custodians in metropolitan areas were $5.49 an hour, which is almost three-fourths as much as the average earnings for all nonsupervisory workers in private industry, except farming. The average for custodians in manufacturing industries was $7.67 and for non-manufacturing industries, $4.86. Earnings, however, vary by industry and area of the country. Workers in large cities of the Northeast, North Central, and Western regions usually earn the highest wages.

Most building service workers receive paid holidays and vacations, and health insurance.

Related Occupations

Custodians are not the only workers who clean and maintain buildings. Some workers who have similar skills and job duties are trash collectors, floor waxers, sweepers, window cleaners, private household workers, gardeners, boiler tenders, hotel housekeepers, and pest controllers.

Sources of Additional Information

Information about custodial jobs and training opportunities may be obtained from the local office of your State employment service.

For information on job opportunities in local areas, contact:

Service Employees International Union, 2020 K St. NW., Washington, D.C. 20006.

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Personal Service Occupations

Personal service workers perform a variety of tasks for other people. They cut hair, make airplane passengers comfortable, conduct tours, take theater tickets, distribute equipment and collect fees at amusement and recreation facilities, shine shoes, care for costumes of entertainers, check coats, carry baggage, care for children, and do household chores for people who cannot manage for themselves. Because the work involves doing things for others, the ability to deal effectively with all kinds of people is a "must." A pleasant personality, tact, and a sense of humor are assets.

Personal service workers held nearly 1.7 million jobs in 1982. *Cosmetologists* and *child care workers* (who supervise children in nursery schools, play groups, and babysitters' own homes) held by far the largest number of jobs, about half a million each.

Some personal service jobs require formal training that lasts from several weeks to a year or so. Flight attendants go to training schools run by the airlines themselves; barbers and cosmetologists generally learn their trade in public or private vocational schools. Most other personal service workers, however, acquire their skills on the job. A high school diploma is necessary for some of these jobs. All employers stress the importance of such personal characteristics as poise, good grooming, and a pleasant disposition. Physical stamina is important, for much of the work involves being on one's feet for long periods of time.

For many young people, a personal service job serves as entry to the work force. The abundance of part-time job opportunities attracts persons of all ages who want to combine a job with family, school, or other responsibilities.

Starting pay in many of these jobs is at or only slightly above the minimum wage. Often, however, workers also receive tips that add substantially to their income. Some workers—cosmetologists in particular—are employed on a commission basis. Many of these workers eventually open their own businesses.

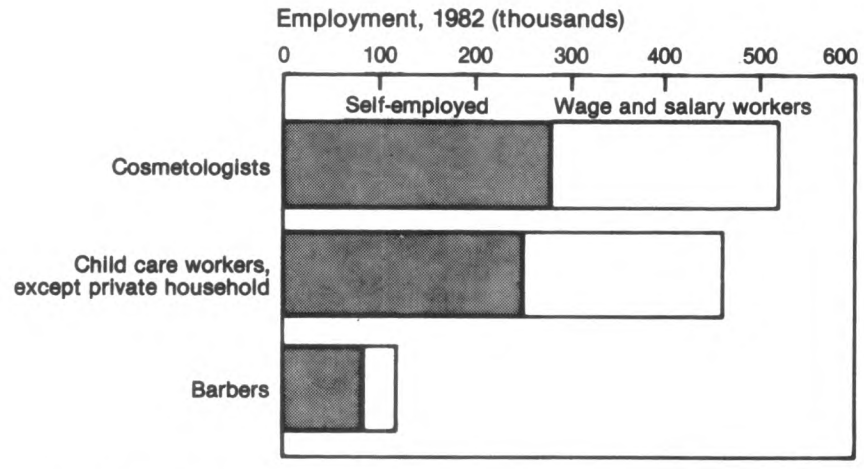
Indeed, the large proportion of people who work for themselves is a distinguishing characteristic of the personal service occupations. In 1982, about two-fifths of these workers were self-employed, compared to about one-tenth of all workers. Running one's own business is especially prevalent among barbers, cosmetologists, and child care workers (see accompanying chart). People who aspire to work for themselves must not only be good enough at what they do to maintain a steady flow of customers, they also must have the drive and business acumen to handle finances, suppliers, and staff.

Most job openings for personal service workers will result from the need to replace those who transfer to other occupations, assume full-time household duties, or stop working for other reasons. Replacement needs are substantial because turnover is high—a characteristic of occupations that require a relatively limited investment in training. There are exceptions, however. Barbers, for example, tend to have a relatively strong attachment to their occupation.

Employment of personal service workers is expected to increase about as fast as the average for all occupations through the mid-1990's in response to population growth, higher incomes, and more multiearner families. For example, demand for child care workers should grow because the labor force participation of mothers of preschool or school-age children is expected to increase through the mid-1990's. Employment of welfare service aides, a category that includes geriatric aides and homemaker-home health aides, will rise in response to increased demand for community and in-home services for the elderly.

For specific information on prospects for barbers, cosmetologists, and flight attendants, see the *Handbook* statements that follow.

Many personal service workers are self-employed.



SOURCE: Bureau of Labor Statistics

Barbers

(D.O.T. 330.371-010 and -014)

Nature of the Work

Barbers cut, trim, shampoo, and style hair. Many people still go to a barber for just a haircut, but more and more seek services such as hairstyling and permanents. Barbers trained in these areas are called "hairstylists" and work in styling salons, "unisex" salons, and some barbershops. They cut and style hair to suit each customer and may color or straighten hair and fit hairpieces. Most barbers offer hair and scalp treatments, shaves, and facial massages.

By tradition, most customers are men. However, a small but growing number of barbers cut and style women's hair. They usually work in unisex salons—shops that have male and female customers. Some States require a cosmetologist's license as well as a barber's license, however, to permanent wave or color women's hair. (The *Handbook* statement on cosmetologists follows this statement.)

As part of their responsibilities, barbers keep their scissors, combs, and other instruments sterilized and in good condition. They clean their work areas and may sweep the shop as well. Some sell lotions, tonics, and other cosmetic supplies. Those who own or manage a shop order supplies, pay bills, keep records, and hire employees.

Working Conditions

Barbers usually work in clean, pleasant surroundings, with good lighting and ventilation. Good health and stamina are important because barbers must stand on their feet a great deal and work with both hands at shoulder level—a position that can be tiring.

Most barbers work more than 40 hours a week, and a workweek of over 50 hours is not uncommon. Although weekends and lunch hours are generally very busy, a barber may

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More than half of all barbers operate their own business.

have some time off during slack periods. To assure an even workload, some barbers ask customers to make appointments.

Employment

Barbers held about 115,000 jobs in 1982. Most worked in barbershops, some worked in beauty shops and unisex salons, and a few worked in department stores, hotels, hospitals, and prisons. About 3 out of every 4 barbers operate their own businesses.

Almost all cities and towns have barbershops, but employment is concentrated in the most populous cities and States. Hairstylists usually work in large cities where the greatest demand for their services exists.

Training, Other Qualifications, and Advancement

All States require barbers to be licensed. The qualifications necessary to get a license vary from one State to another, however. Generally a person must be a graduate of a state-approved barber school and be at least 16 years old (18 in some states). In addition, education requirements vary from State to State—some require graduation from high school while others have no requirement at all.

Many States require a beginner to take an examination for an apprentice license and serve 1 or 2 years as an apprentice before taking the examination required for a license as a registered barber. In the examinations, the applicant usually is required to pass a written test and demonstrate an ability to perform the basic services. Fees for these examinations range from $15 to $85.

Some States have reciprocity agreements that allow licensed barbers to practice in a different State without additional formal training. However, some States do not recognize training, apprenticeship work, or licenses obtained in another State; consequently, persons who wish to become barbers should review the laws of the State in which they want to work before entering a barber school or seeking employment.

Barber training is offered in about 285 schools; 9 out of 10 barber schools are private. Some public high schools offer barbering in their vocational programs. Barber school programs usually last 9 to 12 months. Students buy their own tools, which cost about $600. They study the basic services—haircutting, shaving, facial massaging, and hair and scalp treatments—and, under supervision, practice on customers in school "clinics." Most schools now teach unisex hairstyling and chemical styling as part of their regular curriculum. Besides attending lectures on barber services and the use and care of instruments, students take courses in sanitation and hygiene, and learn how to recognize certain skin conditions. Instruction also is given in selling and general business practices. Advanced courses are available in some localities for barbers who wish to update their skills or specialize in hairstyling, coloring, and the sale and service of hairpieces.

Dealing with customers requires patience and a better than average disposition. In addition, good eye-hand coordination is required. Barbers also should have sound judgment about what hair style is most flattering.

Beginners usually get their first jobs through the barber school they attended.

Some experienced barbers advance by becoming managers of large shops or by opening their own shops. A few may teach at barber schools. Barbers who go into business for themselves must have the capital to buy or rent a shop and install equipment. New equipment for a one-chair shop averaged about $5,000 in 1982. Some shopowners buy used equipment and fixtures at reduced prices, however.

Job Outlook

Over the last 15 years, the demand for barbers has decreased. However, this trend will end, and the demand for barbers should increase—stimulated by population growth and by the increasing popularity of hairstyling. The occupation is expected to grow through the mid-1990's, but more slowly than the average for all occupations.

Barbers have a relatively strong attachment to their occupation—unlike most workers in occupations that require less than a year of formal training. Nevertheless, most job openings will result from the need to replace experienced barbers who retire, die, or stop working for other reasons. Most barbers remain in the occupation until they retire—perhaps because most barbers are self-employed.

The shift in consumer preferences from regular haircuts to more personalized and intensive services also has greatly affected the occupation. Barbers who specialize in hairstyling have been much more successful than those who offer conventional services. This trend is expected to continue, and employment opportunities should be better for hairstylists than for other barbers.

Earnings

Barbers receive income from commissions or wages and tips. Most barbers who are not shopowners normally receive 60 to 70 percent of the money they take in; a few are paid straight salaries.

Most barbers and hairstylists in their first few years of employment earned between $13,000 and $18,000 a year in 1982, according to limited information available. Many experienced barbers and hairstylists earned over $20,000 a year. Hairstylists usually earn more than barbers because the services they provide are more personalized and therefore more expensive.

Earnings depend on the size and location of the shop, customers' tipping habits, competition from other barbershops, and the barber's ability to attract and hold regular customers. Some barbers receive 1- or 2-week paid vacations, insurance, and medical benefits.

The principal union that organizes barbers—both employees and shopowners—is the United Food and Commercial Workers International Union. The principal association that represents and organizes shopowners, managers, and employees is the Associated Master Barbers and Beauticians of America.

Related Occupations

Other workers whose main activity consists of improving a patron's personal appearance include cosmetologists, electrologists, makeup artists, manicurists, scalp treatment operators, and shampooers.

Sources of Additional Information

Lists of barber schools, by State, are available from:

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National Association of Barber Schools, Inc., 304 South 11th St., Lincoln, Nebr. 68508.

National Association of Trade and Technical Schools, 2021 K St. NW., Washington, D.C. 20006.

Every State maintains information on State licensing requirements and approved barber schools. For details, contact the State board of barber examiners or the equivalent authority at your State capital.

Additional information on this occupation is available from:

National Barber Career Center, 3839 White Plains Rd., Bronx, N.Y. 10467.

Associated Master Barbers and Beauticians of America, 219 Greenwich Rd., P.O. Box 220782, Charlotte, N.C. 28222.

Cosmetologists

(D.O.T. 331.674-010; 332.271-010, -014, and -018; and 339.371-014)

Nature of the Work

Hair has been a center of attention since people first began to care about their appearance. Throughout history, a great deal of effort has gone into acquiring a fashionable hairstyle or a perfectly trimmed beard. Although styles change from year to year, the cosmetologist's task remains the same—to help people look attractive.

Cosmetologists, also called *beauty operators*, *hairstylists*, or *beauticians*, shampoo, cut, and style hair, and advise patrons on how to care for their hair. Frequently they straighten or permanent wave a patron's hair to keep the style in shape. Cosmetologists may also lighten or darken the color of the hair. Cosmetologists may give manicures and scalp and facial treatments; provide makeup analysis for women; and clean and style wigs and hairpieces.

Most cosmetologists make appointments and keep records of hair color and permanent wave formulas used by their regular patrons. They also keep their work area clean and sanitize their hairdressing implements. Those who operate their own salons also have managerial duties which include hiring and supervising workers, keeping records, and ordering supplies.

Working Conditions

Cosmetologists generally work in clean, pleasant surroundings, with good lighting and comfortable temperatures. Their work can be arduous and physically demanding because they must be on their feet for hours at a time and work with their hands at shoulder level. Many full-time cosmetologists work more than 40 hours a week, including evenings and weekends when beauty salons are busiest.

Employment

Cosmetologists held about 519,000 jobs in 1982. The overwhelming majority of cosmetologists were women's hairstylists, as indicated by the following tabulation.

Women's hairstylists	491,000
Manicurists	16,000
Shampooers and scalp treatment operators	12,000

Most worked in beauty salons, some worked in "unisex" salons, barber shops, or department stores, and a few were employed by hospitals and hotels. About one-half of all cosmetologists operate their own businesses.

About two-fifths of all cosmetologists work part time. The abundance of part-time jobs attracts many persons who want to combine a job with family, school, or other responsibilities.

All cities and towns have beauty salons, but employment is concentrated in the most populous cities and States. Those cosmetologists who set fashion trends with their hairstyles usually work in New York City, Los Angeles, and other centers of fashion and the performing arts.

Training, Other Qualifications, and Advancement

Although all States require cosmetologists to be licensed, the qualifications necessary to obtain a license vary. Generally, a person must have graduated from a State-licensed cosmetology school, pass a physical examination, and be at least 16 years old. In addition, education requirements vary from State to State—some require graduation from high school while others have no requirement at all. In some States, completion of an apprentice training program can substitute for graduation from a cosmetology school, but very few cosmetologists learn their skills in this way.

Cosmetology instruction is offered in both public and private vocational schools, in either daytime or evening classes. A daytime course usually takes 6 months to 1 year to complete; an evening course takes longer. Many public school programs include the academic subjects needed for a high school diploma and last 2 to 3 years. An apprenticeship program usually lasts 1 or 2 years.

Both public and private programs include classroom study, demonstrations, and practical work. Most schools provide students with the necessary hairdressing implements, such as manicure implements, combs, scissors, razors, and hair rollers, and include their cost in the tuition fee. Sometimes students must purchase their own. A good set of implements costs between $55 and $110. Beginning students work on mannequins or on each other. Once they have gained some experience, students practice on patrons in school "clinics." Most schools now teach unisex hairstyling as part of their regular curriculums. (See the preceding *Handbook* statement on barbers.)

After graduating from a cosmetology program, students take the State licensing examination. The examination consists of a written test and a practical test in which applicants demonstrate their ability to perform the required services. In some States, an oral examination is included, and the applicant is asked to explain the procedures he or she is following while taking the practical test. In some States, a

Cosmetologists cut and style hair and advise customers on how to care for their hair.

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separate examination is given for persons who want only a manicurist's license or a skin care license. Some States have reciprocity agreements that allow a cosmetologist licensed in one State to work in another without reexamination.

For many young people, cosmetology serves as an entry point to the world of work. The field is also characterized by a pattern of movement from family responsibilities into the labor force—when employment and earnings opportunities are attractive enough—and back to the home again. In fact, most entrants to this occupation come from outside the labor force—from homemaking and from school in roughly equal numbers. Relatively few transfer from other occupations.

Persons who want to become cosmetologists must have finger dexterity and a sense of form and artistry. They should enjoy dealing with the public and be willing and able to follow patrons' instructions. Because hairstyles are constantlychanging, cosmetologists must keep abreast of the latest fashions and beauty techniques. Business skills are important for those who plan to operate their own salons.

Many schools help their students find jobs. During their first months on the job, new cosmetologists are given relatively simple tasks, such as giving manicures or shampoos, or are assigned to perform the simpler hairstyling patterns. Once they have demonstrated their skills, they are gradually permitted to perform the more complicated tasks such as hair coloring and permanent waving.

Advancement usually is in the form of higher earnings as cosmetologists gain experience and build a steady clientele, but many manage large salons or open their own after several years of experience. Some teach in cosmetology schools or use their knowledge and skill to demonstrate cosmetics in department stores. Others become sales representatives for cosmetics firms, or open businesses as beauty or fashion consultants. Some cosmetologists work as examiners for State cosmetology boards.

Job Outlook

Job openings for cosmetologists are expected to be plentiful through the mid-1990's. Most openings will result from the need to replace the large number of workers who leave the occupation each year—primarily to devote full time to household responsibilities. Employment of cosmetologists is expected to grow about as fast as the average for all occupations through the mid-1990's in response to population growth, particularly among middle-age persons who are the primary users of cosmetology services, and the rising number of working women. Hairstyling for men also contributes to the demand for cosmetologists because many men go to unisex shops or beauty salons for styling services. Opportunities for part-time work will continue to be very good.

Most people regard spending on grooming care as discretionary. During hard economic times, they tend to visit cosmetologists less frequently, which reduces cosmetologists' earnings. Rarely, however, are cosmetologists laid off solely because of economic downturns.

Earnings

Cosmetologists receive income from commissions or wages, and from tips. Those who are not salon owners receive a percentage of the money they take in, usually 50 percent; a few are paid straight salaries.

Weekly earnings (including tips) of beginning cosmetologists generally ranged between $110 and $160 in 1982, according to limited information available. Experienced cosmetologists usually earned between $250 and $350 a week.

Earnings also depend on the size and location of the salon, patrons' tipping habits, competition from other beauty salons, and the individual cosmetologist's ability to attract and hold regular patrons.

Large salons and department stores offer group life and health insurance and other benefit plans. Nearly all employers provide annual paid vacations of at least 1 week after a year's service.

The principal union which organizes cosmetologists—both employees and salon owners—is the United Food and Commercial Workers International Union. The principal trade association which represents and organizes salon owners, managers, and employees is the National Hairdressers and Cosmetologists Association, Inc. Other organizations include the Associated Master Barbers and Beauticians of America; the National Association of Cosmetology Schools, Inc., which represents school owners and teachers; and the National Beauty Culturists' League, representing black cosmetologists, teachers, managers, and salon owners.

Related Occupations

Other workers whose main activity consists of helping patrons improve their personal appearance include barbers, electrologists, makeup artists, and health club managers.

Sources of Additional Information

A list of licensed training schools and licensing requirements can be obtained from State boards of cosmetology or from:

National Accrediting Commission of Cosmetology Arts and Sciences, 1990 M St. NW., Suite 650, Washington, D.C. 20036.

Additional information about careers in cosmetology and State licensing requirements is available from:

National Beauty Career Center, 3839 White Plains Rd., Bronx, N.Y. 10467.

National Hairdressers and Cosmetologists Association, 3510 Olive St., St. Louis, Mo. 63103.

For general information about the occupation, contact:

Associated Master Barbers and Beauticians of America, 219 Greenwich Rd., P.O. Box 220782, Charlotte, N.C. 28222.

National Association of Cosmetology Schools, 1990 M St. NW., Suite 650, Washington, D.C. 20036.

Flight Attendants

(D.O.T. 352.367-010)

Nature of the Work

Flight attendants (also called stewardesses and stewards) are aboard almost all passenger planes to look after the passengers' flight safety and comfort.

Before each flight, attendants are briefed by the captain on expected weather conditions, special passenger problems, and other matters. They see that the passenger cabin is in order, that supplies of food, beverages, blankets, and reading material are adequate, and that first aid kits and other emergency equipment are aboard. As passengers come aboard, attendants greet them, check their tickets, and assist them in storing coats and carry-on luggage.

Before the plane takes off, attendants instruct passengers in the use of emergency equipment and check to see that all passengers have their seat belts fastened. In the air, they answer questions about the flight, distribute magazines and pillows, and help care for small children and elderly and handicapped persons. They may administer first aid to passengers who become ill. Attendants also serve cocktails and other refreshments and, on many flights, heat and distribute precooked meals. After the plane has landed, the flight attendant assists passengers as they leave the plane. They then prepare reports on medications given to passengers, lost and found articles, and cabin equipment conditions. Some flight attendants straighten up the plane's cabin.

Assisting passengers in the rare event of an emergency is one of the most important functions of attendants. This may range from reassuring passengers during occasional encounters with strong turbulence to opening emergency exits and inflating evacuation chutes following an emergency landing.

Working Conditions

Since airlines operate around the clock year round, attendants may work at night and on holidays and weekends. They usually fly 75 to 85 hours a month, but they may work up to 50 hours a month on the ground to prepare planes for flight. Because of variations in scheduling and limitations on flying time, many attendants have 15 days or more off each month. Attendants may be away from their home bases at least one-third of the time. During this period, the airlines provide hotel accommodations and an allowance for meal expenses.

Flight attendants have the opportunity to meet interesting people and see new places. The combination of free time and discount air fares provides substantial opportunity for travel. However, the work can be strenuous and trying. Short flights require speedy service if meals are served. A rough flight can make serving drinks and meals difficult. Attendants

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stand during much of the flight and must remain pleasant and efficient regardless of how tired they are or how demanding passengers may be.

Employment

Flight attendants held 54,000 jobs in 1982. Commercial airlines employed the vast majority of all flight attendants, most of whom were stationed in major cities at the airlines' home bases. A small number of flight attendants worked for large companies that operate their own aircraft for business purposes.

Training, Other Qualifications, and Advancement

The airlines like to hire poised, tactful, and resourceful people who can deal comfortably with strangers. Applicants usually must be at least 19 years old, but some airlines have higher minimum age requirements. Flight attendants must have excellent health, good vision, and the ability to speak clearly.

Applicants must be high school graduates. Those having several years of college or experience in dealing with the public are preferred. Flight attendants for international airlines generally must speak an appropriate foreign language fluently.

Most large airlines require that newly hired flight attendants complete 4 to 6 weeks of intensive training in their own schools. The few airlines that do not operate schools generally send new employees to the school of another airline. Transportation to the training centers and an allowance for board, room, and school supplies may be provided. Trainees learn emergency procedures such as evacuating an airplane, operating an oxygen system, and giving first aid. Attendants also are taught flight regulations and duties, and company operations and policies. Trainees receive instruction on personal grooming and weight control. Trainees for the international routes get additional courses in passport and customs regulations. Towards the end of their training, students go on practice flights. Attendants periodically receive additional training in emergency procedures and passenger relations throughout their careers.

After completing initial training, flight attendants are assigned to one of their airline's bases. New attendants are placed in "reserve status" and either are called on to staff extra flights or fill in for attendants who are sick or on vacation. Reserve attendants on duty must be available on short notice. Attendants usually remain on reserve for at least 1 year; at some cities it may take as long as 5 years to advance from reserve status. Advancement takes longer today than in the past because experienced attendants are remaining in this career for more years than they used to. Attendants who no longer are on reserve bid for regular assignments. Because these assignments are based on seniority, usually only the most experienced attendants get their choice of base and flights.

Flight attendants help make a passenger's flight safer and more comfortable.

Opportunities for advancement to other jobs are limited. However, some attendants may advance to flight service instructor, customer service director, recruiting representative, or various other administrative positions.

Job Outlook

Competition for jobs as flight attendants is expected to remain very keen through the mid-1990's because the number of applicants is expected to greatly exceed the number of job openings. The glamour of the airline industry and opportunity to travel attract many applicants. Those with at least 2 years of college and experience in dealing with the public have the best chance of being hired.

Employment of flight attendants is expected to grow about as fast as the average for all occupations through the mid-1990's. Growth in population and income is expected to increase the number of airline passengers. Airlines usually enlarge their capacity by increasing the number and size of planes in operation. Since Federal Aviation Administration safety rules require 1 attendant for every 50 seats, more flight attendants will be needed.

As more career-minded people enter this occupation, job turnover will decline. Nevertheless, most job openings are expected from the need to replace attendants who stop working or transfer to other occupations.

Employment of flight attendants is sensitive to cyclical swings in the economy. During recessions, when the demand for air travel declines, many flight attendants are put on part-time status or are laid off. Until demand increases, few new attendants are hired.

Earnings

Beginning flight attendants averaged about $16,000 a year in 1982. Annual earnings of flight attendants averaged about $21,000. In addition, flight attendants and their immediate families are entitled to reduced fares on their own and most other airlines.

Many flight attendants belong to the Association of Flight Attendants. Others are members of the Transport Workers Union of America or several other unions.

Related Occupations

Other jobs that involve helping people and require the ability to be pleasant even under trying circumstances include tour guide, gate agent, host or hostess, waiter or waitress, and camp counselor.

Sources of Additional Information

For further information, request *Flight Attendants*, publication GA-300-127 (enclose a self-addressed mailing label), from: U.S. Government Printing Office, Library and Statutory Distribution Service, 5208 Eisenhower Ave., Alexandria, Va. 22304.

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, 1709 New York Ave. NW., Washington, D.C. 20006.

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OTHER SERVICE OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Bakers, bread and pastry	Mix and bake ingredients according to recipes to produce breads, pastries, and other baked goods. Goods are produced in smaller quantities for consumption on premise or for sale as specialty baked goods.	36,000	About as fast as average
Bellhops, bag porters, and doorkeepers	Perform general services concerned with catering to wants of guests at hotels or related establishments such as escorting guests to rooms; carrying luggage; running errands; delivering ice, beverages, and packages; and paging guests.	26,000	More slowly than average
Child care attendants	Entertain children or groups of children in homes or business establishments.	47,000	About as fast as average
Child-care workers	Serve and assist children in their daily activities and needs in institutions, special schools, day-care centers or nursery schools. May be under direction of professional staff.	414,000	About as fast as average
Crossing or bridge tenders	Guard railroad crossings to warn motorists and pedestrians of approaching trains. Many control adjustable bridges over waterways to permit passage of vessels.	27,000	More slowly than average
Exterminators	Spray chemical solutions or toxic gases and set mechanical traps to kill pests that infest buildings and surrounding areas.	22,000	Faster than average
Food service workers, fast food restaurants	These workers are employed in fast food type restaurants whose menus are limited to a few primary items such as hamburgers, roast beef or chicken. Duties are rotated between counter service and kitchen duties in such a way that any one worker will perform all or most duties and operate all or most equipment over a period of time. From day to day the job title may change according to duties (i.e., Grill Worker, French Frier, or Counter Worker).	809,000	Faster than average
Game operators, ride operators and concession workers	Includes workers in carnivals, stadiums, parks or other amusement places who operate or tend games of chance or skill, mechanical riding devices, or refreshment or souvenir concession stands. May also solicit patronage, collect tickets or fees, or clean and repair booths and mechanical devices.	53,000	More slowly than average
Hosts/hostesses, restaurant, lounge or coffee shop	Welcome patrons, seat them at tables or in lounge, and insure quality of facilities and service.	113,000	Faster than average
Housekeepers	Supervise work activities of cleaning personnel to insure clean, orderly, attractive rooms in hotels, hospitals, educational institutions, and similar establishments. Assign duties, inspect work, investigate complaints regarding housekeeping service and equipment, and take corrective action. May purchase housekeeping supplies and equipment, and take periodic inventories. May screen applicants, train new employees, and recommend dismissals.	101,000	About as fast as average
Kitchen helpers	Perform tasks to maintain kitchen work areas and restaurant equipment and utensils in clean and orderly condition.	850,000	Faster than average
Lifeguards	Monitor activities in swimming areas to prevent accidents. May teach swimming or water safety.	34,000	Faster than average
Pantry, sandwich and coffee makers	Pantry makers prepare salads, appetizers, sandwich fillings and other cold dishes. Sandwich makers prepare sandwiches to individual orders of customers. Coffee makers make coffee, tea or hot chocolate.	84,000	Faster than average
Pharmacy helpers	Mix pharmaceutical preparations, under direction of pharmacists. Issue medicines, label and store supplies, and clean equipment and work areas.	33,000	Faster than average
Private household workers	Perform household tasks such as cleaning, cooking, and caring for children.	1,023,000	Expected to decline
Psychiatric aides	Working under direction of nursing and medical staff, assist mentally ill patients.	132,000	Faster than average

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OTHER SERVICE OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Recreation facility attendants	Schedule and coordinate use of recreation facilities such as golf courses or tennis courts. May collect fees, issue or sell athletic equipment, or clean and repair equipment and facilities.	72,000	About as fast as average
School crossing guards	Guard street crossings during hours when children are going to or coming from school.	38,000	More slowly than average
Store detectives	Protect property, merchandise, and money of stores or similar establishments by detecting theft, shoplifting, or other unlawful practices by public or by employees.	19,000	Faster than average
Ushers, lobby attendants, and ticket takers	Assist patrons at entertainment events such as sporting events, drive-in or motion picture performances. May assist in finding seats, searching for lost articles, and locating such facilities as restrooms and telephones. Collect admission tickets and passes from patrons.	40,000	Little change is expected
Waiter's assistants	Carry dirty dishes from dining room to kitchen. Replace soiled table linens and set tables with silverware and glassware, etc. Replenish supply of clean linens, silverware, glassware, and dishes. Supply services bar with food, such as soups, salads, and desserts. Serve water and coffee to patrons.	302,000	About as fast as average
Welfare service aides	Provide various specified duties to help clients obtain and use social and related services under supervision of professional staff or as part of a team.	93,000	About as fast as average

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Agricultural and Forestry Occupations

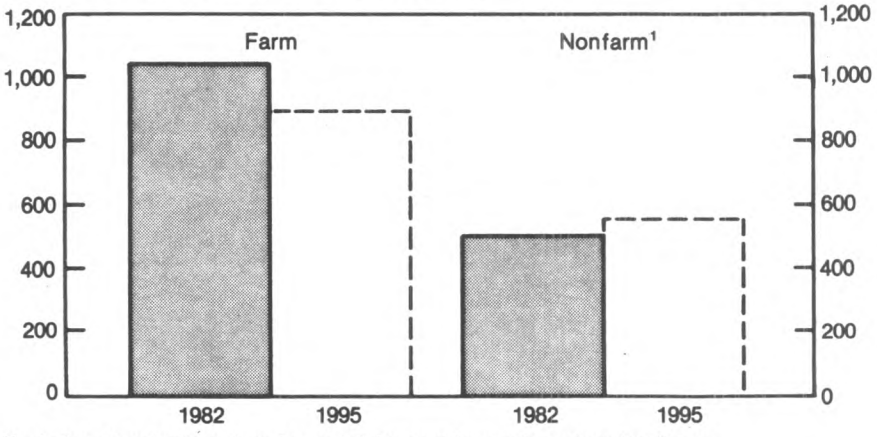
Agricultural and forestry workers are involved in the development, production, and distribution of basic products that meet our country's needs for food, clothing, and shelter. Agricultural workers raise crops and livestock that provide food as well as material for clothing. Forestry workers harvest trees that provide lumber for housing and other buildings as well as material for a variety of paper products. Producing these goods requires many different kinds of workers, ranging from scientists who develop high-yield seeds and fertilizers to the farmers, ranchers, and timbercutters who harvest the crops.

Training requirements vary widely among agricultural and forestry occupations. Farm laborers and loggers, for example, can learn their jobs in a few weeks by observing and helping experienced workers. Because of the complexity of modern agriculture and forestry, however, many jobs in these fields require some technical training. Forestry technicians, for example, need 1 or 2 years of specialized, postsecondary training. College training is required for many agriculture and forestry engineering, research, and administrative jobs.

Growing up on a family farm and participating in farming programs for young people such as Future Farmers of America or the 4-H Clubs is still an important source of training for prospective farmers. However, because of the scientific and business complexities of modern farming, an increasing number of young people who live on farms find it desirable to attend a 2- or 4-year college of agriculture.

While employment in farm occupations is expected to decline, other agricultural occupations are expected to grow.

Wage and salary employment (thousands)



[1]Includes all agriculture, forestry, and fishery workers not employed on farms

SOURCE: Bureau of Labor Statistics

Demand for food, fiber, and wood will increase as the world population grows. The agricultural and forestry processing and distribution system is expected to grow to accommodate this higher demand. However, the development and use of more productive farming and forestry methods will limit employment growth in many agricultural and forestry occupations.

The number of farmers is expected to decline as farms become more expensive to buy and operate. Both the average size of farms and the price of farmland have increased greatly in recent years, which add considerably to the cost of buying a farm. Because operating costs—feed, seed, fertilizer, fuel, and financing—also have risen substantially, large farms are more economical than small ones. The trend toward fewer and larger farms is expected to reduce the number of jobs for farm operators.

Employment of farm laborers and logging workers is expected to decline as machinery makes it possible to harvest more crops and timber with fewer workers.

As farming becomes more complex, the demand for farm managers with specialized skills and knowledge is expected to increase. The need for farm managers also may increase because people who inherit farms often do not want to work the land themselves.

Opportunities for employment in agricultural and forestry research, engineering, and administration will vary among occupations. However, job prospects generally will be better than in other farm and forestry occupations.

The following tabulation presents information on the work, employment, and growth adjective for several agricultural and forestry occupations.

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OTHER AGRICULTURAL AND FORESTRY OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Animal caretakers	Feed, water, groom, exercise or otherwise care for small or large animals, fish or birds in zoos, circuses, pounds, laboratories, animal hospitals, aquariums, kennels or stables. Clean and repair cages, pens, or fish tanks. May administer tests to experimental animals or give treatments to sick or injured animals. May keep records of feedings, tests and treatments, and or animals received and discharged.	105,000	More slowly than average
Forest conservation workers	Develop, maintain, and protect forest, forested areas, and woodlands through such activities as raising and transplanting tree seedlings; locating and combating fires, insects, pests, and diseases harmful to trees; and controlling erosion and leaching of forest soil.	12,000	Little change is expected
Gardeners and groundskeepers, except farm	Maintain lawns, trees, and gardens in places such as private estates, golf courses, memorial parks. May also care for buildings and equipment in these places.	664,000	More slowly than average
Timbercutting and logging workers	Cut down trees marked for harvesting and saw limbs and trunks into logs. May clear land for building sites and utility lines.	62,000	Expected to decline

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Mechanics and Repairers

In our high-technology society, machines of one type or another touch almost all aspects of our lives. Machines, including robots, produce our goods. Transportation equipment carries both goods and people anywhere in the world. Telephones and other communication equipment convey information quickly and efficiently. Appliances make our household chores easier. Mechanics and repairers maintain and repair these and the many other types of machines we rely on.

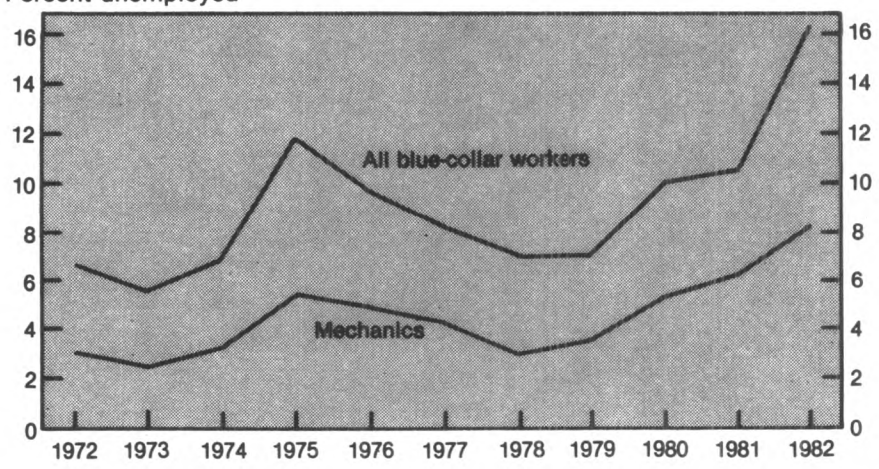
One-fourth of all mechanics and repairers work on motor vehicles in occupations such as automobile mechanic, truck or bus mechanic, and automobile body repairer. The remaining three- fourths work on a variety of machines in occupations such as appliance repairer, computer service technician, telephone repairer, and musical instrument repairer.

Mechanics and repairers work in all industries in the economy. Almost one-fifth work in manufacturing industries—the majority in plants that produce durable goods such as steel, automobiles, and aircraft. Another one-fifth work in retail trade—mainly in firms that sell and service automobiles, household appliances, farm implements, and other mechanical equipment. About one-seventh work in shops that service machines of all types. Most of the remaining mechanics and repairers work for transportation, construction, and public utilities companies, and all levels of government.

Training for most mechanic and repairer occupations requires both classroom instruction in machine operation and practice in repair work. Mechanics get this training through high school and postsecondary programs and on-the-job training.

For almost all mechanic and repairer occupations, employers prefer high school graduates. Courses in shop math, blueprint reading, drafting, woodworking, metalworking, and electronics give students basic mechanical knowledge and skills.

The unemployment rate for mechanics generally is much lower than the rate for blue-collar workers as a whole.



SOURCE: Bureau of Labor Statistics

Training in specific areas—appliance repair, automobile maintenance and repair, television repair—is available through high schools, private vocational schools, community colleges, correspondence schools, and the Armed Forces. These vocational programs include instruction in machine operation and experience with actual or demonstration machinery. Although completion of such training does not assure a job, employers increasingly prefer to hire people with some training or experience.

New mechanics and repairers usually receive on-the-job training from their employer. This training may involve classroom instruction and practice work with demonstration machines. However, it frequently consists only of supervision by an experienced worker.

To keep up with improved technology, mechanics and repairers must continue their training throughout their careers. They study the repair books and technical manuals that accompany new equipment and attend classes run by equipment manufacturers.

Physical requirements for work in this field vary greatly. For example, telephone lineworkers must be strong and agile to lift heavy equipment and work in awkward positions. Watch repairers need good vision and excellent finger dexterity. For occupations in which the repairer deals with customers, the ability to work with people is important.

For most mechanic occupations, advancement is limited to supervisory positions. Some of these occupations, however, offer good opportunities for self-employment.

Employment of mechanics and repairers as a group is expected to increase about as fast as the average for all occupations through the mid-1990's to keep up with maintenance and repair work associated with increased use of household appliances, automobiles, computers, and industrial and other machinery. Although thousands of jobs will be created by growth in demand, most openings will arise in this relatively large occupational category as experienced workers leave the field for a variety of reasons.

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Vehicle and Mobile Equipment Mechanics and Repairers

Vehicle and mobile equipment mechanics and repairers maintain and repair a wide variety of automotive vehicles and mobile equipment. They service vehicles such as automobiles, trucks, buses, aircraft, boats, and motorcycles. They also work on heavy construction, logging, railroad, and farm machinery, as well as smaller gasoline-powered equipment such as portable generators and lawnmowers.

Mechanical aptitude and manual skills are essential to vehicle and mobile equipment mechanics and repairers. They also need reading and writing skills in order to consult repair and technical manuals, read work orders, and write parts lists and descriptions of their work. They must be able to work efficiently and with precision since their earnings often depend on how rapidly they can correctly perform maintenance or repairs. They must also be capable of handling heavy or unwieldy parts or components.

Employers usually prefer to hire high school graduates, but frequently hire those without high school diplomas if they can read and write adequately. Most mechanics and repairers acquire their skills on the job following the instructions of experienced workers, reading repair manuals, and solving problems on their own. Formal mechanic training acquired in high school, vocational or technical school, or in the Armed Forces is an asset to persons entering mechanic and repairer careers.

This section describes five groups of vehicle and mobile equipment mechanics and repairers: Aircraft mechanics; automotive body repairers; automotive mechanics; diesel mechanics; and farm equipment mechanics. Other mechanic and repairer careers are described in subsequent sections.

Aircraft Mechanics

(D.O.T. 621.281 except -030, .381 except -018; 693.260-014; 806.281-038; 807.261-010, .381-014; 825.281-018; and 862.381-010)

Nature of the Work

Most travelers hardly think twice about flying thousands of feet above the ground. The confidence they have in aircraft is a tribute to the mechanics who maintain them. To keep aircraft in top operating condition, mechanics perform scheduled maintenance, make repairs, and complete inspections required by the Federal Aviation Administration (FAA).

Many mechanics specialize in scheduled maintenance. Following a schedule that is based on the number of hours flown, calendar days, or a combination of these factors, mechanics inspect the engines, landing gear, instruments, and other parts of the aircraft and do the necessary maintenance. For example, they may examine an engine through specially designed openings while working from ladders or scaffolds, or use hoists or lifts to remove the entire engine from the craft. After taking the engine apart, mechanics may use sensitive instruments to measure parts for wear, and use X-ray and magnetic inspection equipment to check for invisible cracks. Worn or defective parts are replaced. They also may repair sheet-metal surfaces, measure the tension of control cables, or check for rust, distortion, and cracks in the fuselage and wings. Mechanics test the equipment to make sure the repairs were made properly.

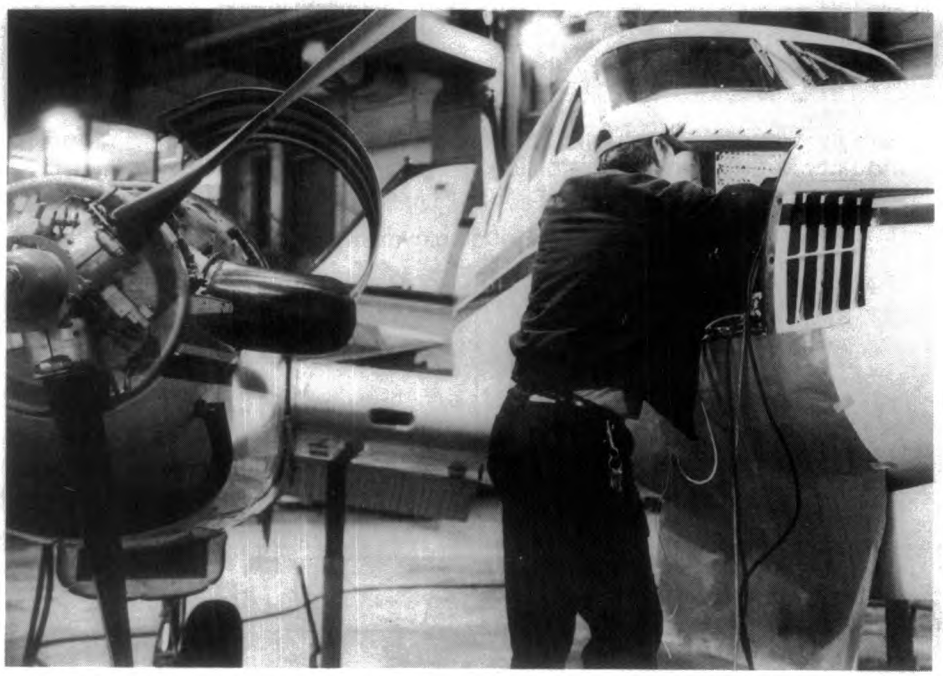
Mechanics specializing in repair work use the pilot's description of a problem to find and fix faulty equipment. For example, during a preflight check, a pilot may discover that the aircraft's gas gauge does not work. To solve the problem, mechanics may check the electrical connections, replace the gauge, or use electrical test equipment to make sure no wires are broken or shorted. They work as fast as safety permits so that the aircraft can be put back into service quickly.

Mechanics may work on one or many different types of aircraft, such as jets, propeller-driven airplanes, and helicopters, or, for efficiency, may specialize in one section of a particular type of aircraft, such as the engine or electrical system. Mechanics employed by companies that own their own aircraft usually must handle all repair and maintenance work such as body, air-conditioning, plumbing, and electrical repair. In small, independent repair shops, mechanics usually inspect and repair many different types of aircraft.

Working Conditions

Mechanics usually work in hangars or other indoor areas. However, if the hangars are full or if repairs must be made quickly, they may work outdoors, sometimes in unpleasant weather. This occurs most often to airline mechanics who work at airports because, to save time, minor repairs and preflight checks often are made at the terminal. Mechanics often work under the pressure of time to maintain flight schedules or, in general aviation, to keep from inconveniencing customers. At the same time, mechanics must maintain safety standards.

Frequently, mechanics must lift or pull as much as 50 pounds. They often stand, lie, or kneel in awkward positions and occasionally must work in precarious positions on scaffolds or ladders. Noise and vibration are common when testing engines. Aircraft mechanics generally work 40 hours a week on 8-hour shifts around the clock.



Mechanics make sure a plane is safe for flight.

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Employment

Aircraft mechanics held about 108,000 jobs in 1982. Nearly two-fifths worked for airlines, about one-fourth for the Federal Government, and about one-fifth for aircraft assembly firms. Most of the rest were general aviation mechanics, the majority of whom worked for independent repair shops or companies that operate their own planes to transport executives and cargo. Very few mechanics were self-employed. (The accompanying chart indicates the percent distribution of wage and salary jobs by industry.)

Most airline mechanics work near large cities at the airlines' main stops. Many employees of the Federal Government are civilians employed by the Armed Forces and work at military aviation installations. Others work for the FAA, many in the headquarters at Oklahoma City. Mechanics for independent repair shops work at airports in every part of the country.

Training, Other Qualifications, and Advancement

The majority of mechanics who work on civilian aircraft are licensed by the FAA as "airframe mechanics," "powerplant mechanics," or "aircraft inspectors." Airframe mechanics are qualified to work on the fuselage, wings, landing gear, and other structural parts of the plane; powerplant mechanics are qualified only for work on the engine. Combination airframe-and-powerplant mechanics can work on any part of the plane, and those with an inspector's license can certify inspection work completed by other mechanics. Unlicensed mechanics are supervised by those with licenses.

The FAA requires at least 18 months of work experience for an airframe or powerplant license. For a combined license, at least 30 months of experience working with both engines and airframes are required. To obtain an inspector's license, a mechanic must have held an airframe-and-powerplant license for at least 3 years. Applicants for all licenses also must pass written and oral tests and demonstrate that they can do the work authorized by the license.

Although a few people become mechanics through on-the-job training, most learn their job in the Armed Forces or in trade schools certified by the FAA. Courses in these trade schools last from 18 months to 2 years and provide training with the tools and equipment used on the job. For an FAA license, attendance at such schools may substitute for work experience. However, these schools do not guarantee jobs or FAA licenses.

Some aircraft mechanics in the Armed Forces acquire enough general experience to satisfy the work experience requirements for the FAA license. With additional study, they may pass the licensing exam. Generally, however, jobs in the military services are too specialized to provide the broad experience required by the FAA. Most have to complete the entire training program at a trade school, although a few receive some credit for the material they learned in the service. Military experience is a great advantage when seeking employment; employers consider trade school graduates who have this experience to be the most desirable applicants.

A high school diploma or its equivalent is necessary for all prospective aircraft mechanics. Courses in mathematics, physics, chemistry, electronics, computer science, and mechanical drawing are helpful because knowledge of the principles involved in the operation of an aircraft often is necessary to make repairs. As new and more complex aircraft are designed, mechanics must update their skills. Recent technological advances in aircraft maintenance necessitate a strong background in electronics—both for acquiring and retaining jobs in this field.

Aircraft mechanics must do careful and thorough work and have the strength to lift heavy parts and tools. Agility is important for the reaching and climbing necessary for the job. Aircraft mechanics must not be afraid of heights since they work on the top of wings and fuselages on large jet planes.

As aircraft mechanics gain experience, they advance to more responsible jobs. Opportunities are best for those who have an aircraft inspector's license as well as an airframe-and-powerplant license. A mechanic may advance to head mechanic (or crew chief), to inspector, to head inspector, and to shop supervisor. In the airlines, where promotion is often determined by examination, a few supervisors advance to executive positions. With additional business training, some may open their own repair shops.

Job Outlook

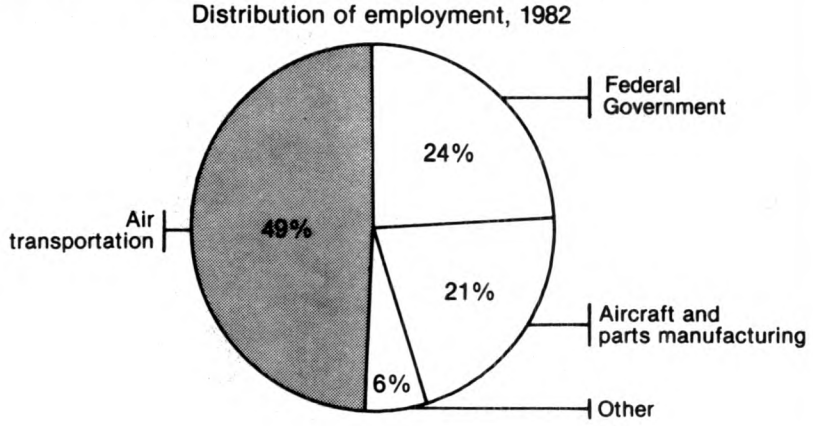
The number of aircraft mechanics is expected to increase more slowly than the average for all occupations through the mid-1990's. A growing population and rising incomes are expected to stimulate the demand for airline transportation, and the number of private and commercial aircraft is expected to grow. However, labor-saving advances in aircraft maintenance should limit employment of mechanics. Most job openings are expected to arise from the need to replace mechanics who transfer to other fields of work, retire, die, or stop working for other reasons.

Job opportunities are expected to be best in general aviation, particularly for qualified mechanics who are willing to relocate. Since wages in small companies tend to be relatively low, there is less competition for these jobs than in the airlines. Also, some jobs will become available as experienced mechanics leave for better paying jobs with airlines or large private companies. In contrast with general aviation, competition for airline jobs should remain keen because the high wages attract more qualified applicants than the number of available openings.

The number of mechanics employed by the Federal Government is expected to grow slowly—consistent with the pattern of growth expected for the Federal work force as a whole. Opportunities will fluctuate with changes in defense spending.

Declines in air travel during recessions force airlines to curtail the number of flights. Fewer flights mean less aircraft maintenance and consequently layoffs for aircraft mechanics.

Although aircraft mechanics are concentrated in the transportation industry, a substantial proportion work for the Federal Government and in aircraft manufacturing.



SOURCE: Bureau of Labor Statistics

Earnings

In 1982, the median annual salary of aircraft mechanics was $21,500. Mechanics who worked on jets generally earned more than those working on other aircraft. The top 10 percent of all aircraft mechanics earned over $33,000 a year. Airline mechanics and their immediate families receive reduced fare transportation on their own and most other airlines.

Mechanics employed by most major airlines are covered by union agreements. Their earnings generally are higher than mechanics working for other employers. The principal unions in this field are the International Association of Machinists and Aerospace Workers, and the Transport Workers Union of America. Some mechanics are represented by the International

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Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America.

Related Occupations

Some other occupations that involve similar mechanical and electrical work are automotive body repairers, automotive mechanics, electricians, elevator repairers, and telephone maintenance mechanics.

Sources of Additional Information

For general information about aircraft mechanics, write to:

Aviation Maintenance Foundation, P.O. Box 739, Basin, Wyo. 82410.

For further information, request *Aviation Maintenance*, publication GA-300-133 (enclose a self-addressed mailing label), from:

U.S. Government Printing Office, Library and Statutory Distribution Service, 5208 Eisenhower Ave., Alexandria, Va. 22304.

Information about jobs in a particular airline may be obtained by writing to the personnel manager of the company. For addresses of airline companies, write to:

Air Transport Association of America, 1709 New York Ave. NW., Washington, D.C. 20006.

For information on jobs in a particular area, contact employers at local airports or local offices of the State employment service.

Automotive Body Repairers

(D.O.T. 620.684-034; 807.281-010, .381-010, and .684-010)

Nature of the Work

Thousands of motor vehicles are damaged in traffic accidents every day. Although some are wrecked, most can be made to look and drive like new. Automotive body repairers straighten bent frames, remove dents, and replace crumpled parts that are beyond repair. Usually, they can fix all types of vehicles, but most body repairers work on cars and small trucks. A few work on large trucks, buses, or tractor trailers.

When a damaged vehicle is brought into the shop, body repairers generally receive instructions from their supervisors, who have determined which parts are to be restored or replaced and how much time the job should take.

Automotive body repairers use special machines to restore damaged frames and body sections to their original shape and location. They chain or clamp the frames and sections to alignment machines that usually use hydraulic pressure to align the damaged metal.

Body repairers remove badly damaged sections of body panels with a pneumatic metal-cutting gun or acetylene torch and weld in new sections to replace them. Repairers push out less serious dents with a hydraulic jack or hand prying bar, or knock them out with handtools or pneumatic hammers. They smooth out small dents and creases by holding a small anvil against one side of the damaged area while hammering the opposite side. They remove very small pits and dimples with pick hammers and punches.

Body repairers also repair or replace the plastic body parts used increasingly on newer model automobiles. They remove the damaged panels and determine the type of plastic from which they are made. With most types, they can apply heat from a hot air welding gun or by immersion in hot water, and press the softened panel back into its original shape by hand. They replace plastic parts which are more difficult to repair.

Body repairers use plastic or solder to fill small dents which cannot be worked out of the plastic or metal panel. On metal panels, they then file or grind the hardened filler to the original shape and sand it before painting. In many shops, automotive painters do the painting. (These workers are discussed elsewhere in the *Handbook*.) In smaller shops, workers often do both body repairing and painting. Some body repairers also replace safety glass. A few specialize in repairing fiberglass bodies.

Body repair work has variety and challenge—each damaged vehicle presents a different problem. Repairers must develop appropriate methods for each job, using their broad knowledge of automobile construction and repair techniques.

Body repairers usually work alone with only general directions from supervisors. In some shops, they may be assisted by helpers or apprentices. In large shops, body repairers may specialize in one type of repair, such as frame straightening or door and fender repairing.

Working Conditions

Automotive body repairers work indoors in body shops which are noisy because of the banging of hammers against metal and the whir of power tools. Most shops are well ventilated, but often they are dusty and smell of paint. Body repairers often work in awkward or cramped positions, and much of their work is strenuous and dirty. Hazards include cuts from sharp metal edges, burns from torches and heated metal, and injuries from power tools.

Employment

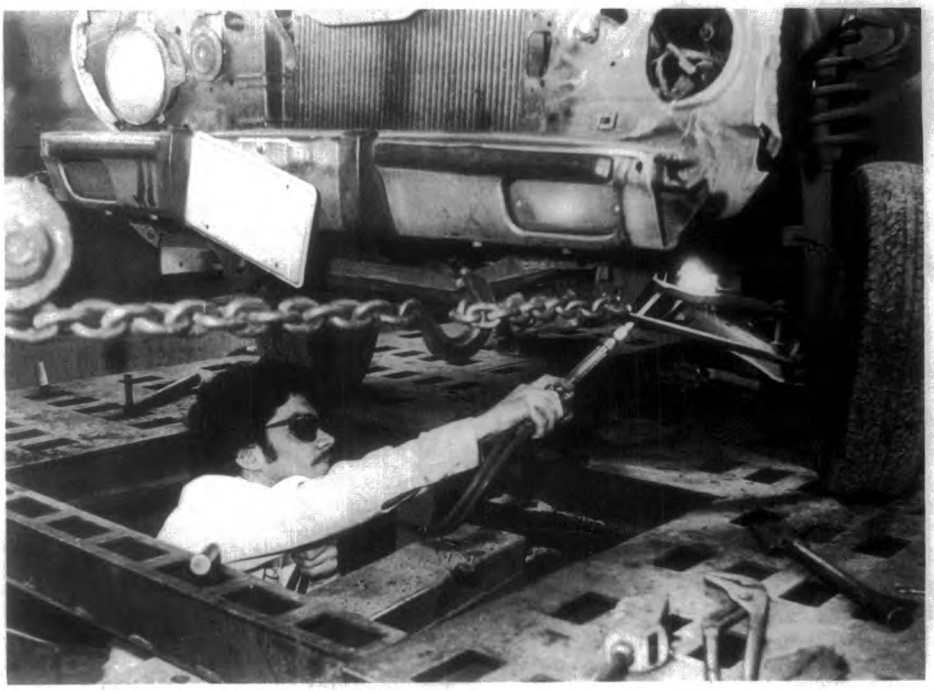
Automotive body repairers held about 155,000 jobs in 1982. Most worked for shops that specialized in body repairs and painting, and for automobile and truck dealers. Others worked for organizations that maintain their own motor vehicles, such as trucking companies and buslines. A few worked for motor vehicle manufacturers. About 1 automotive body repairer out of 4 was self employed.

Automotive body repairers work in every section of the country. Jobs are distributed in about the same way as the population.

Training, Other Qualifications, and Advancement

Most automotive body repairers enter the occupation by transfer from related helper positions. Helpers learn the trade on the job, picking up skills from experienced body repairers. Helpers begin by assisting body repairers in tasks such as removing damaged parts and installing repaired parts. They learn to remove small dents and to make other minor repairs. They then progress to more difficult tasks such as straightening frames. Generally skill in all aspects of body repair requires 3 to 4 years of on-the-job training.

A 3- or 4-year formal apprenticeship program is a desirable way to learn the trade, but relatively few employers are willing to make such a lengthy commitment. When these programs are available, apprenticeship includes both on-the-job training and classroom instruction. Apprentices spend most of their time learning on the job, but they also attend classes



Automotive body repairers use alignment machines to straighten damaged frames and body sections.

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in related subjects such as mathematics, job safety procedures, and business management.

Persons who want to learn this trade should be in good physical condition and know how to use tools. Although completion of high school generally is not required, many employers prefer to hire high school graduates. Courses in automotive body repair offered by high schools, vocational schools, private trade schools, and community colleges are helpful, as are courses in automotive mechanics. Completion of a formal training program in automotive body repair can enhance chances for employment and promotion to a journeyman position.

Voluntary certification by the National Institute for Automotive Service Excellence is recognized as a standard of achievement for automotive body repairers. To be certified, a body repairer must pass a written examination and must have at least 2 years of experience in the trade. Completion of a high school, vocational school, or trade school program in automotive body repair may be substituted for 1 year of work experience. Automotive body repairers must retake the examination at least every 5 years to retain certification.

Automotive body repairers must buy their own tools, but employers sometimes furnish power tools. Trainees generally accumulate tools as they gain experience, and many workers have hundreds of dollars invested in tools.

An experienced automotive body repairer with supervisory ability may advance to shop supervisor. Many workers open their own body repair shops. A few become automobile damage appraisers for insurance companies.

Job Outlook

Employment of automotive body repairers is expected to increase about as fast as the average for all occupations through the mid-1990's, as more motor vehicles are damaged in accidents as the number of motor vehicles grows. Although turnover in body repair jobs is lower than in most other occupations, the need to replace experienced repairers who retire, transfer to other occupations, or stop working for other reasons will account for most job openings.

The automotive repair business is not very sensitive to changes in economic conditions, and experienced body repairers are rarely laid off. Although major body damage must be repaired if an automobile is to be restored to safe operating condition, repair of minor dents and crumpled fenders can often be deferred. As a result, most employers hire fewer new workers during an economic slowdown. Thus, persons seeking to enter this occupation may face increased competition for jobs during recessions.

Earnings

Body repairers employed by automobile dealers in 24 large metropolitan areas had average hourly earnings of about $12.31 in 1982. Average earnings varied by region as follows:

West	$13.00
South	12.85
North Central	12.62
Northeast	10.17

Helpers and trainees usually earn from 30 to 60 percent of the earnings of skilled workers.

Many body repairers employed by automobile dealers and repair shops are paid a commission, usually about half of the labor cost charged to the customer. Under this method, earnings depend on the amount of work assigned to the repairer and how fast it is completed. Employers frequently guarantee commissioned workers a minimum weekly salary. Helpers and trainees usually receive an hourly rate until they are skilled enough to work on commission. Body repairers who work for trucking companies, buslines, and other organizations that maintain their own vehicles usually receive an hourly wage. Most body repairers work 40 to 48 hours a week.

Many automotive body repairers are members of unions, including the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the Sheet Metal Workers' International Association; and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America (Ind.). Most body repairers who are union members work for large automobile dealers, trucking companies, and buslines.

Related Occupations

Repairing damaged motor vehicles often involves working on their mechanical components as well as their bodies. Automotive body repairers often work closely with the following related occupations: Automotive repair service estimators, mechanics, painters and body customizers, and diesel mechanics.

Sources of Additional Information

More details about work opportunities may be obtained from automotive body repair shops and automobile dealers; locals of the unions previously mentioned; or the local office of the State employment service. The State employment service also is a source of information about apprenticeship and other training programs.

For general information about the work of automotive body repairers and apprenticeship training, write to:

Automotive Service Industry Association, 444 North Michigan Ave., Chicago, Ill. 60611.

Automotive Service Councils, Inc., 188 Industrial Dr., Suite 112, Elmhurst, Ill. 60126.

National Institute for Automotive Service Excellence, 1825 K St. NW., Washington, D.C. 20006.

Automotive Mechanics

(D.O.T. 619.380-018; 620.261-010, -012, -030, and -034, .281-010, -026 through -038, -046, -054, -062, -066, and -070, .381-010 and -022, .684-018 through -026; 706.381-046; 721.281-010; 806.684-118; 807.664-010; 825.281-022 and .381-014)

Nature of the Work

Automotive mechanics repair and service motor vehicles with gasoline engines. (Mechanics who work on diesel-powered trucks, buses, and equipment are discussed in the succeeding *Handbook* statement on diesel mechanics.) Anyone whose car, truck, or bus has broken down knows the importance of the automotive mechanic's job. The ability to make a quick and accurate diagnosis, one of the mechanic's most valuable skills, requires good reasoning ability and a thorough knowledge of automobiles. In fact, many mechanics consider diagnosing "hard to find" troubles one of their most challenging and satisfying duties.

When mechanical or electrical troubles occur, mechanics first get a description of the symptoms from the owner or, if they work in a dealership, the repair service estimator who wrote the repair order. The mechanic may have to test drive the car or use testing equipment, such as motor analyzers, spark plug testers, or compression gauges, to locate the problem. Once the cause of the problem is found, mechanics make adjustments or repairs. If a part is damaged or worn beyond repair, or cannot be fixed at a reasonable cost, they replace it.

Automotive mechanics use a variety of tools in their work. They use power tools such as pneumatic wrenches to remove bolts quickly; machine tools such as lathes and grinding machines to rebuild brakes and other parts; welding and flame-cutting equipment to remove and repair exhaust systems and other parts; jacks and hoists to lift cars and engines; and common handtools such as screwdrivers, pliers, and wrenches to work on small parts and get at hard-to-reach places.

Most automotive mechanics perform a variety of repairs; others specialize. For example, *automatic transmission mechanics* work on gear trains, couplings, hydraulic pumps, and other parts of automatic transmissions. Because these are complex mechanisms, their repair requires considerable experience and training, including a knowledge of hydraulics. *Tune-up mechanics* adjust the ignition timing and valves, and adjust or replace spark plugs and other parts to ensure efficient engine performance. They often use scientific test equipment to help them adjust and locate malfunctions in fuel, ignition, and emissions control systems.

Automotive air-conditioning mechanics install air-conditioners and service components such as compressors and condensers. *Front-end mechanics* align and balance wheels and repair steering mechanisms and suspension systems. They frequently use special alignment equipment and wheel-balancing machines. *Brake repairers* adjust brakes, replace brake linings and pads, repair hydraulic cylinders, and make other repairs on brake systems. Some mechanics specialize in both brake and front-end work.

Automotive-radiator mechanics clean radiators with caustic solutions, locate and solder leaks, and install new radiator cores. They also may repair heaters and air-conditioners, and solder leaks in gasoline tanks.

Automotive electricians repair and overhaul electrical systems and components. They may use electricians' handtools to repair or replace defective wiring and electrical units, such as

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starters and generators. To locate electrical system malfunctions, they often use ammeters, ohmmeters, and voltmeters.

To prevent breakdowns, mechanics check parts and adjust, repair, or replace them before they go bad. Mechanics usually follow a checklist to be sure they examine all important parts, such as belts, hoses, steering systems, spark plugs, brake and fuel systems, wheel bearings, and other potentially troublesome items.

Working Conditions

Generally, mechanics work indoors. Modern automotive repair shops are well ventilated, lighted, and heated, but older shops may not be. Mechanics frequently work with dirty and greasy parts, and in awkward positions. They often must lift heavy parts and tools. Minor cuts and bruises are common, but serious accidents may be avoided when the shop is kept clean and orderly and safety practices are observed.

Employment

Automotive mechanics held about 844,000 jobs in 1982. Most worked for automotive dealers, automotive repair shops, gasoline service stations, and department stores that have automotive service facilities. Others were employed by Federal, State, and local governments, taxicab and automobile leasing companies, and other organizations that repair their own fleets of automobiles and gasoline-powered trucks. Motor vehicle manufacturers employed some mechanics to adjust and repair cars at the end of assembly lines. About 1 out of 5 automotive mechanics was self-employed.

Automobile mechanics work in every section of the country. Geographically, employment is distributed about the same as the population.

Training, Other Qualifications, and Advancement

Although there is no formal educational requirement for entry into automotive mechanics, training in automotive mechanics at a community college or a vocational or technical school is desirable. These programs usually take 1 or 2 years and lead to an associate degree or a certificate in automotive technology. As the complexity of automotive technology continues to increase, the importance of formal instruction as a foundation for later on-the-job training has grown. Courses in electronics are highly desirable because electronic controls are increasingly being designed into automotive components.

Many automotive mechanics still learn the trade primarily on the job. Beginners usually start as helpers, lubrication workers, or gasoline station attendants and gradually acquire skills by working with experienced mechanics. Although a beginner can make simple repairs after a few months' experience, it usually takes 1 to 2 years of experience to become a service mechanic and make the more difficult types of routine service and repairs. An additional 1 to 2 years are usually required to reach the journeyman level and become familiar with all types of repairs. An additional year or two is necessary to learn a difficult specialty, such as automatic transmission repair. In contrast, radiator mechanics and brake specialists, who do not need an all-round knowledge of automobile repair, may learn their jobs in about 2 years.

A small number of persons enter the occupation through a 3- or 4-year formal apprenticeship program. Apprenticeship programs are offered through motor vehicle dealers and independent repair shops, but the number of employers willing to make such a long-term commitment is declining. Typical 4-year apprenticeship programs consist of about 8,000 hours of shop training to obtain practical experience working on brakes, chassis, transmissions, engines, electrical systems, exhaust emission controls, and other components. Programs usually require that at least 576 of these hours consist of formal instruction about these subjects and topics such as motor theory, use of blueprints and shop manuals, and safety.

For entry jobs, employers look for people with mechanical aptitude and a knowledge of automobiles. Experience working on cars in the Armed Forces or as a hobby is valuable. Completion of high school is also an advantage in obtaining an entry job. Courses in automotive repair, physics, chemistry, and mathematics can help a person better understand how an automobile operates.

Mechanics usually buy their handtools, and beginners are expected to accumulate tools as they gain experience. Many experienced mechanics have thousands of dollars invested in tools. Employers furnish power tools, engine analyzers, and other test equipment.

Employers increasingly send experienced mechanics to factory training centers to learn to repair new models or to receive special training in automatic transmission or air-conditioning repair. Motor vehicle dealers may also send promising beginners to factory-sponsored mechanic training programs. Factory representatives come to many shops to conduct short training sessions. Mechanics also must read service and repair manuals to keep abreast of new technology.

Voluntary certification by the National Institute for Automotive Service Excellence is widely recognized as a standard of achievement for automobile mechanics. Mechanics are certified in 1 or more of 8 different service areas, such as tune-ups, brake and front-end work, or electrical system repair. General automotive mechanics are certified in all eight areas. For certification in each area, mechanics must have at least 2 years of experience and pass a written examination; completion of an automotive mechanic program in high school, vocational or trade school, or community or junior college may be substituted for 1 year of experience. Certified mechanics must retake the examination at least every 5 years.

Experienced mechanics who have leadership ability may advance to shop supervisor or service manager. Mechanics who work well with customers may become automotive repair service estimators.

Job Outlook

Job opportunities in automotive mechanics are expected to be plentiful for persons who complete training programs at community colleges and vocational and technical schools. Persons without training beyond high school are likely to face competition for entry level jobs. Although more job openings are expected for automotive mechanics than for most other occupations, careers in automotive mechanics are attractive to many because they afford the opportunity for good pay and the satisfaction of skilled work with one's hands.

Employment of automotive mechanics is expected to increase faster than the average for all occupations through the mid-1990's. The number of mechanics is expected to increase because expansion of the driving age population and rising consumer purchasing power will increase the number of motor vehicles on the road. The growing complexity of automotive technology, particularly the use of electronics, increasingly necessitates that cars and trucks be serviced by professionals, contributing to growth in demand for automotive mechanics. Employment also is expected to grow because more automobiles will have pollution control and safety devices, air-conditioning, and other features that require maintenance.

Despite projected faster-than-average growth in employment, the main source of job openings for automotive mechanics will be the need to replace experienced workers who transfer to other occupations, retire, or stop working for other reasons. Replacement needs will be substantial, in large part, because of the size of the occupation.

Most persons who enter the occupation may expect steady work because changes in economic conditions have little effect on the automotive repair business. During a downturn, however, some employers may be more reluctant to hire inexperienced workers.

Earnings

Highly skilled journey automotive mechanics employed by automobile dealers in 24 cities had average hourly earnings of $11.63 in 1982. Less skilled service mechanics who perform routine service and make minor repairs had

Automotive mechanics frequently must work in awkward positions.

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average hourly earnings of $8.79, and lubricators averaged an estimated $8.01 an hour in 1982.

Many experienced mechanics employed by automotive dealers and independent repair shops receive a commission related to the labor cost charged to the customer. Under this method, weekly earnings depend on the amount of work completed by the mechanic. Employers frequently guarantee commissioned mechanics a minimum weekly salary.

Most mechanics work between 40 and 48 hours a week, but many work even longer hours during busy periods.

Some mechanics are members of labor unions. The unions include the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the Sheet Metal Workers' International Association; and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America (Ind.).

Related Occupations

Other workers who repair and service motor vehicles include automotive body repairers, customizers, painters, and repair service estimators as well as diesel mechanics.

Sources of Additional Information

For more details about work opportunities, contact local automotive dealers and repair shops; locals of the unions previously mentioned; or the local office of the State employment service. The State employment service also may have information about apprenticeship and other training programs.

For general information about the work of automotive mechanics and apprenticeship training, write to:

Automotive Service Industry Association, 444 North Michigan Ave., Chicago, Ill. 60611.

Automotive Service Councils, Inc., 188 Industrial Dr., Suite 112, Elmhurst, Ill. 60126.

Information on how to become a certified automotive mechanic is available from:

National Institute for Automotive Service Excellence, 1825 K St. NW., Washington, D.C. 20006.

Diesel Mechanics

(D.O.T 625.261-010, .281-010 and -014, and .361-010)

Nature of the Work

Diesel engines are stronger and thus last longer than gasoline engines. In addition, they use fuel more efficiently than gasoline engines because the higher compression ratios found in diesel engines convert a higher percentage of the fuel into power. Because of their greater durability and efficiency, diesel engines are used to power most of the Nation's heavy vehicles and equipment.

Diesel mechanics repair and maintain diesel engines that power transportation equipment, such as heavy trucks, buses, and locomotives; and construction equipment such as bulldozers, cranes, and road graders. A small, but growing number work on diesel-powered automobiles. Diesel mechanics also service a variety of other diesel-powered equipment, such as electric generators and compressors and pumps used in oil well drilling and in irrigation.

Most diesel mechanics work on heavy trucks. Heavy trucks are used by industries such as mining and construction to carry ore and building materials, and by commercial trucking lines for general freight hauling. Most light trucks are gasoline powered, and although some diesel mechanics service gasoline engines, most work primarily on diesel. For information on mechanics who work primarily on gasoline engines, see the preceding *Handbook* statement on automotive mechanics.

Mechanics who work for organizations that maintain their own vehicles may spend much time doing preventive maintenance to assure safe operation, prevent wear and damage to parts, and reduce costly breakdowns. During a maintenance check on a truck, for example, they usually follow a regular check list that includes the inspection of brake systems, steering mechanisms, wheel bearings, and other important parts. They usually can repair or adjust a part that is not working properly. Parts that cannot be fixed are replaced.

In many shops, mechanics do all kinds of repair work. For example, they may work on a vehicle's electrical system one day and do major engine repair the next. In some large shops, mechanics specialize in one or two types of work. For example, one mechanic may specialize in major engine repair, another in transmission work, another in electrical systems, and yet another in suspension or brake systems.

Diesel mechanics use a variety of tools in their work. They use power tools such as pneumatic wrenches to remove bolts quickly; machine tools such as lathes and grinding machines to rebuild brakes and other parts; welding and flame-cutting equipment to remove and repair exhaust systems and other parts; common handtools such as screwdrivers, pliers, and wrenches to work on small parts and get at hard-to-reach places; and jacks and hoists to lift and move large parts. Diesel mechanics also use a variety of testing equipment. For example, when working on electrical systems, they may use ohmmeters, ammeters, and voltmeters; to locate engine malfunctions, they often use tachometers and dynamometers.

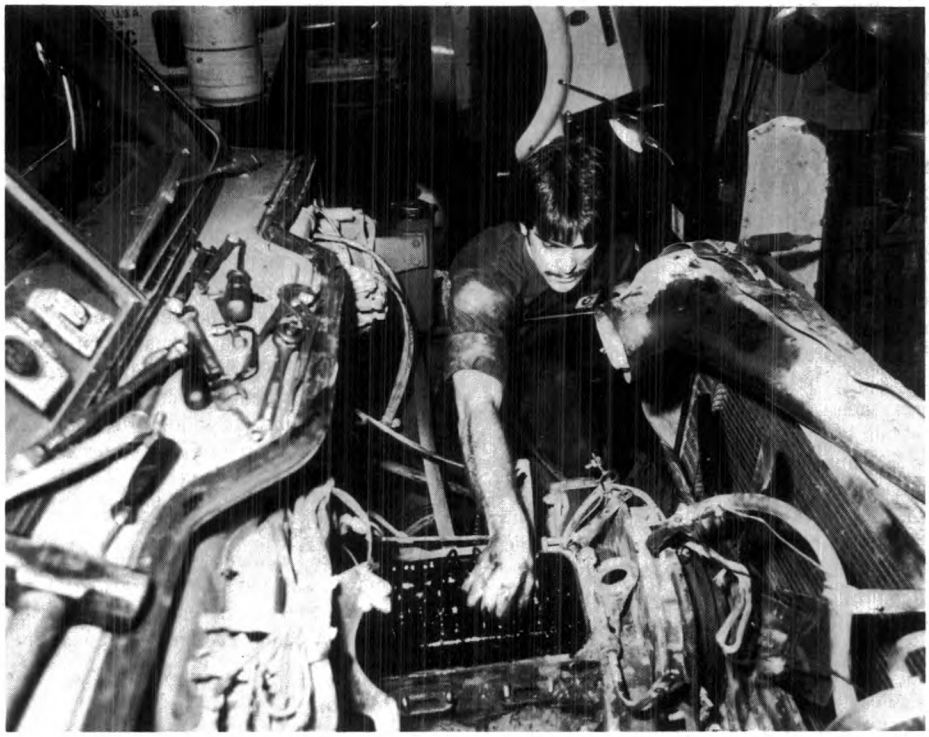
For heavy work, such as removing engines and transmissions, two mechanics may work as a team, or a mechanic may be assisted by an apprentice or helper. Mechanics generally get their assignments from shop supervisors or service managers who may check the mechanics' work or assist in diagnosing problems.

Working Conditions

Diesel mechanics usually work indoors, although they may occasionally work or make repairs on the road. They are subject to the usual shop hazards such as cuts and bruises. Mechanics handle greasy and dirty parts and may stand or lie in awkward or cramped positions to repair vehicles and equipment. Work areas usually are well lighted, heated, and ventilated, and many employers provide locker rooms and shower facilities.

Employment

Diesel mechanics held about 173,000 jobs in 1982. Most worked for firms that owned fleets of trucks, including construction and trucking



Diesel mechanics handle greasy and dirty parts and may stand or lie in awkward or cramped positions.

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companies and businesses that haul their own products, such as dairies and bakeries. Others worked for heavy truck dealers, dealers of diesel-powered light trucks and automobiles, truck repair shops, firms that rent or lease trucks, and Federal, State, and local governments. About one-fifth worked for companies that sell and service construction and mining machinery and industrial equipment, such as compressors, pumps, and generators. A small number of diesel mechanics serviced buses for local transit companies and intercity buslines. Others maintained diesel locomotives for railroads.

Diesel mechanics are employed in every section of the country, but most work in large towns and cities where trucking companies, buslines, and other fleet owners have large repair shops.

Training, Other Qualifications, and Advancement

Most diesel mechanics learn their skills on the job. Beginners usually do tasks such as cleaning parts, fueling, lubricating, and driving vehicles in and out of the shop. As beginners gain experience and as vacancies become available, they usually are promoted to mechanics' helpers. In some shops, beginners—especially those having automobile service experience—start as mechanics' helpers.

Most helpers can make minor repairs after a few months' experience and advance to increasingly difficult jobs as they prove their ability. After they master the repair and service of diesel engines, they learn to work on related components such as brakes, transmissions, or electrical systems. Generally, at least 3 to 4 years of on-the-job experience are necessary to qualify as an all-round diesel truck or bus mechanic. Additional training may be necessary for mechanics who wish to specialize in diesel equipment.

For entry jobs, employers generally look for applicants who have mechanical aptitude and are at least 18 years of age and in good physical condition. Completion of high school also is desirable. A State chauffeur's license is needed for test driving trucks or buses on public roads.

Most employers prefer graduates of formal training programs in diesel mechanics. These 1-2 year programs, given by vocational and technical schools and community and junior colleges, lead to a certificate of completion or an associate degree. They provide a foundation in the basics of the latest diesel technology, such as the use of electronics, and speed advancement to the journeyman mechanic level.

A formal 4-year apprenticeship is another good way to learn diesel mechanics. While never plentiful, apprenticeships are becoming rare because employers are reluctant to make such a long-term investment in training, especially when graduates of postsecondary diesel mechanic programs are increasing in number. Typical apprenticeship programs for diesel truck and bus mechanics consist of approximately 8,000 hours of practical experience working on transmissions, engines, and other components and at least 576 hours of formal instruction to learn blueprint reading, mathematics, engine theory, and safety. Frequently, these programs include training in both diesel and gasoline engine repair.

High school auto shop and science and mathematics classes help a mechanic understand how engines and vehicles operate. Practical experience in automobile repair in a gasoline service station or the Armed Forces or from a hobby also is valuable.

Most mechanics must buy their own handtools. Experienced mechanics often have thousands of dollars invested in tools.

Employers sometimes send experienced mechanics to special training classes conducted by truck, bus, diesel engine, parts, and equipment manufacturers where they learn the latest technology or receive special training in subjects such as diagnosing engine malfunctions. Mechanics also must read service and repair manuals to keep abreast of engineering changes.

Voluntary certification by the National Institute for Automotive Service Excellence is recognized as a standard of achievement for diesel mechanics. Mechanics may be certified as general heavy duty diesel truck mechanics or may be certified in 1 or more of 6 different areas of heavy duty diesel truck repair: Brakes, gasoline engines, diesel engines, drive trains, electrical systems, and suspension and steering. A general truck mechanic may also meet the requirements for certification in gasoline instead of diesel engines, and the other four areas. For certification in each area, mechanics must pass a written examination and have at least 2 years of experience. High school, vocational or trade school, or community or junior college training in gasoline or diesel engine repair may substitute for up to 1 year of experience. Certified mechanics must retake the tests at least every 5 years.

Experienced mechanics who have leadership ability may advance to shop supervisors or service managers. Mechanics who have sales ability sometimes become sales representatives. A few mechanics open their own repair shops.

Job Outlook

Employment of diesel mechanics is expected to increase about as fast as the average for all occupations through the mid-1990's as freight transportation by truck increases. More trucks will be needed for both local and intercity hauling due to the increased production of goods. Additional diesel mechanics will be needed to repair and maintain growing numbers of buses and heavy construction graders, cranes, and earthmovers. The increasing popularity of diesel-powered automobiles and light trucks for personal transportation will also create new diesel mechanic jobs. The majority of job openings, nevertheless, will arise from the need to replace diesel mechanics who transfer to other occupations, retire, or stop working for other reasons.

Careers in diesel mechanics are attractive to many because wages are relatively high and skilled repair work is challenging and varied. Opportunities will be best for persons who complete formal training in diesel mechanics at community and junior colleges and vocational and technical schools.

Earnings

Diesel mechanics employed by trucking companies, buslines, and other firms that maintain their own vehicles had average hourly earnings of $11.19 in 1982. Earnings generally were highest in the West and lowest in the South, and varied by industry as follows:

Transportation	$11.73
Manufacturing	10.97
Retail trade	10.60
Wholesale trade	10.24
Services	9.41

Beginning apprentices usually earn one-half the rate of skilled workers and receive increases about every 6 months until they complete their apprenticeship and reach the rate of skilled mechanics.

Most mechanics work between 40 and 48 hours per week. Those employed by truck and bus firms which provide service around the clock may work evenings, nights, and weekends. They usually receive a higher rate of pay for this work.

Many diesel mechanics are members of labor unions, including the International Association of Machinists and Aerospace Workers; the Amalgamated Transit Union; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the Transport Workers Union of America; the Sheet Metal Workers' International Association; and the International Brotherhood of Teamsters, Chauffers, Warehousemen and Helpers of America (Ind.).

Related Occupations

Diesel mechanics repair trucks and buses and keep them in good working order. Related motor vehicle service occupations include automotive body repairers, customizers, mechanics, painters, and repair service estimators.

Sources of Additional Information

More details about work opportunities for diesel mechanics may be obtained from local employers such as trucking companies, truck dealers, or bus lines; locals of the unions previously mentioned; or the local office of the State employment service. Local State employment service offices also may have information about apprenticeships and other training programs.

For general information about the work of diesel mechanics and apprenticeship training, write to:

American Trucking Associations, Inc., 1616 P St. NW., Washington, D.C. 20036.

Automotive Service Industry Association, 444 North Michigan Ave., Chicago, Ill. 60611.

International Association of Machinists and Aerospace Workers, Apprenticeship Department, 1300 Connecticut Ave. NW., Washington, D.C. 20036.

Information on how to become a certified heavy duty diesel mechanic is available from :

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National Institute for Automotive Service Excellence, 1825 K St. NW., Washington, D.C. 20006.

Farm Equipment Mechanics

(D.O.T. 624.281, .361-014, and .381)

Nature of the Work

Many years ago, farmers planted, cultivated, and harvested their crops using only handtools and simple, animal-drawn equipment. Few repairs were required, and if a stray rock or stump broke a plow blade, the metal pieces could be joined together by the local blacksmith. Even when tractors began to replace animals as the prime source of power, the early models were not very complicated and most farmers did their own repair work.

But in the last quarter century, farm equipment has grown enormously in size, complexity, and variety. Many farms have both diesel and gasoline tractors, some equipped with 300-horsepower and larger engines. Harvesting combines, hay balers, corn pickers, crop dryers, planters, tillage equipment, and elevators also are common. In today's world of large-scale, mechanized agriculture, few if any types of farming can be done economically without specialized machines.

As farm machinery grew more complex, it became important for the sellers of farm equipment to be able to service and repair the machines they sold. Almost every dealer employs farm equipment mechanics to do this work and to maintain and repair the smaller lawn and garden tractors dealers sell to surburban homeowners.

In addition, some mechanics who work for dealers and equipment wholesalers assemble new implements and machinery and sometimes do body work, repairing dented or torn sheet metal on the tractors or other machinery.

Mechanics spend much of their time repairing and adjusting malfunctioning equipment that has been brought to the shop. But during planting and harvesting, they may travel to the farm to make emergency repairs on equipment so that critical farming operations are not unduly delayed.

Mechanics also perform preventive maintenance. Periodically, they test, adjust, and clean parts and tune engines. In large shops, mechanics may specialize in certain types of work, such as gasoline or diesel engine overhaul, hydraulics, or clutch and transmission repair. Others specialize in repairing the air-conditioning units often included in the cabs of combines and large tractors, or in repairing certain types of equipment such as hay balers. Some mechanics also repair plumbing, electrical, irrigation, and other equipment on farms.

Mechanics use many basic handtools including wrenches, pliers, hammers, and screwdrivers. They also may use precision equipment such as micrometers and torque wrenches and engine testing equipment, such as dynamometers to measure engine performance, or compression testers to find worn piston rings or leaking cylinder valves. They may use welding equipment or power tools to repair broken parts.

Working Conditions

Generally, farm equipment mechanics work indoors. Modern farm equipment repair shops are well ventilated, lighted, and heated, but older shops may not offer these advantages. During planting and harvesting seasons, mechanics often make emergency repairs in the field. To do so, mechanics may have to travel many miles and work in all types of weather. Farm equipment mechanics come in contact with grease, gasoline, rust, and dirt, and there is danger of injury when they repair heavy parts supported on jacks or by hoists. Care must also be used to avoid burns from hot engine parts, cuts from sharp edges of machinery, and injury from farm chemicals.

Employment

Farm equipment mechanics held nearly 26,000 jobs in 1982. Most worked in service departments of farm equipment dealers. Others worked in independent repair shops, in shops on large farms, and in service departments of retail lawn and garden supply stores. Most farm equipment mechanics work in small repair shops. About one-fifth of the farm equipment mechanics are self-employed.

Because some type of farming is done in nearly every area of the United States, farm equipment mechanics are employed throughout the country. Employment is concentrated in small cities and towns, making this an attractive career choice for people who do not wish to live the fast-paced life of an urban environment. However, many mechanics work in the rural fringes of metropolitan areas, so farm equipment mechanics who prefer the conveniences of city life need not live in rural areas.

Training, Other Qualifications, and Advancement

Employers prefer applicants who have an aptitude for mechanical work. A farm background is an advantage since growing up on a farm usually provides experience in basic farm equipment repairs. Employers also prefer high school graduates, but some will hire applicants who have less education. In general, employers stress previous experience or training in diesel and gasoline engines, the maintenance and repair of hydraulics, and welding—subjects that may be learned in many high schools and vocational schools. Mechanics also must be able to read circuit diagrams and blueprints in order to make complex repairs to electrical and other systems.

Most farm equipment mechanics are hired as trainees and learn the trade on the job by assisting qualified mechanics. The length of training varies with the helper's aptitude and prior experience. At least 2 years of on-the-job training usually are necessary before a mechanic can do the more routine types of repair work, and additional training and experience are required for highly specialized repair and overhaul jobs.

Many farm equipment mechanics enter this occupation from a related occupation. For instance, they may gain experience as farmers and farm laborers, or as heavy equipment mechanics, auto mechanics, or air-conditioning mechanics. People who enter from related occupations also may start as helpers, but they may not require a long period of on-the-job training.

With the development of more complex farm implements, technical training has become more important. A growing number of large

Farm equipment mechanics often work long hours making emergency repairs in the field during planting and harvesting seasons.

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employers prefer applicants who have completed 1 or 2 years of training in agricultural mechanics, including electronics, at a vocational or technical school or community or junior college.

A few farm equipment mechanics learn the trade by completing an apprenticeship program, which lasts from 3 to 4 years and includes on-the-job as well as classroom training in all phases of farm equipment repair and maintenance. Applicants for these programs usually are chosen from shop helpers.

Keeping abreast of changing farm equipment technology requires a great deal of careful study of service manuals and analysis of complex diagrams. Many farm equipment mechanics and trainees receive refresher training in short-term programs conducted by farm equipment manufacturers. These programs usually last several days. A company service representative explains the design and function of equipment and teaches maintenance and repair on new models of farm equipment. In addition, some dealers may send employees to local vocational schools that teach special weeklong classes in subjects such as air-conditioning repair or hydraulics.

Persons considering a career in this field should have the manual dexterity needed to handle tools and equipment. Occasionally, strength is required to lift, move, or hold heavy parts in place. Difficult repair jobs require problem-solving abilities to diagnose the source of the machine's malfunction. Experienced mechanics should be able to work independently with minimum supervision.

Farm equipment mechanics may advance to shop supervisor, service manager, or manager of a farm equipment dealership. Some mechanics open their own repair shops. A few farm equipment mechanics earn 2-year associate degrees in agricultural mechanics and advance to service representatives for farm equipment manufacturers.

Job Outlook

Little or no change in the employment of farm equipment mechanics is expected through the mid-1990's. Most job openings will arise each year as experienced mechanics transfer to other occupations, retire, or stop working for other reasons. Opportunities will be best for persons with technical training and for applicants who have lived or worked on farms and know how to operate farm machinery and make minor repairs.

Continued consolidation of farm land into fewer and larger farms, requiring less farm equipment, is expected to restrict growth of farm equipment mechanic jobs. The development of more technically advanced farm equipment, however, should make it more difficult for farmers to do their own repairs. Thus, farmers will have to rely more on skilled mechanics in the future. For instance, many newer tractors have much larger, more complex engines and air-conditioned cabs, which have improved the comfort of the operator, and feature advanced transmissions with many speeds. More complex electrical systems also are used to operate the great variety of gauges and warning devices now used to alert the operator to problems such as brake wear, low oil pressure in the transmission, or insufficient coolant in the radiator. In addition to the development of larger and more complex farm machinery, sales of smaller lawn and garden equipment have increased vastly over the past decade and are expected to continue to do so. Most of the large manufacturers of farm equipment now offer a line of these smaller tractors and sell them through their established dealerships. Although relatively few mechanics service this equipment, more will be needed.

As with most agricultural occupations, the demand for farm equipment mechanics is highest during planting and harvesting seasons. During these busy periods, mechanics often work 6 or 7 days a week, 10 to 12 hours daily. In winter months, however, mechanics may work less than 40 hours a week and some may be laid off.

The agriculture equipment industry experiences periodic declines—mostly in sales. Layoffs of mechanics, however, are uncommon because farmers often elect to repair old equipment rather than purchase new equipment.

Earnings

Salaried farm equipment mechanics had median annual earnings of $14,000 in 1982, according to the limited information available. Half earned between $11,000 and $17,300 a year. The highest salaries were paid to workers with the most experience and to those performing the most complicated repairs. In addition, higher salaries were paid in the heavily agricultural regions where competition is greatest for the more highly skilled mechanics. Most farm equipment mechanics also have the opportunity to work overtime during the planting and harvesting seasons, for which they generally are paid time and one-half.

Very few farm equipment mechanics belong to labor unions, but those who do are members of the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America (Ind.).

Related Occupations

Other workers who work on large machinery and whose jobs often are in small towns and other nonmetropolitan areas include automotive mechanics, diesel mechanics, and construction equipment mechanics.

Sources of Additional Information

Details about work opportunities may be obtained from local farm equipment dealers and local offices of the State employment service. For general information about the occupation, write to:

National Farm and Power Equipment Dealers Association, 10877 Watson Rd., St. Louis, Mo. 63127.

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Electrical and Electronic Equipment Repairers

Electrical and electronic equipment are among the hallmarks of our high-technology society. Electrical and electronic equipment repairers install, maintain, and repair this equipment. Many of them deal with the highly complex communications and data transmission equipment that, within a very short time, has brought computers into everyday use in factories, business offices, hospitals, schools, stores, ticket offices, and private homes.

Mechanical aptitude and a knowledge of electrical theory are essential in these occupations. For many of them, some knowledge of advanced electronic theory and skill in the use of electronic testing equipment are also necessary.

At the entry level, some repairers may need only a high school diploma. They acquire specific job skills through on-the-job training, a formal apprenticeship, or an employer's training program. For many of these jobs, however, employers require formal training in electronics, which may be obtained in Armed Forces schools, vocational-technical institutes, community colleges, or private trade schools. Continuing education is important in this rapidly changing field, and many electronic equipment repairers periodically attend company-sponsored training sessions to learn about new technological advances and to sharpen their repair skills.

This section of the *Handbook* describes six repair occupations: Communications equipment mechanics, line installers and cable splicers, computer service technicians, appliance installers and repairers, telephone and PBX installers and repairers, and television and radio service technicians.

Appliance Installers and Repairers

(D.O.T. 637.261-010 and -018; 723.381, .584-010; 729.281-022; 731.684-022; and 827.261, .464-010, and .661-010)

Nature of the Work

Household chores such as cooking and cleaning that once took a great deal of time and physical effort are today much simpler to do—thanks to a variety of laborsaving appliances. Microwave ovens cook meals in minutes. Washers and dryers clean clothes with little physical effort. Indeed, the number of household jobs machines can do is almost limitless. Installing and servicing these machines is the job of the appliance installer and repairer—often called appliance service technician.

Appliance service technicians usually specialize in servicing either portable appliances such as toasters and vacuum cleaners or major appliances such as refrigerators, freezers, washers, and dryers. Repairers in large shops generally are more specialized than those in small shops.

Portable appliances are worked on in shops. Major appliances usually are repaired in customers' homes by appliance repairers who carry their tools and a number of commonly used parts with them in a truck.

To determine why an appliance fails to operate or work properly, technicians look for frequent sources of trouble, such as faulty electrical connections, and consult service manuals and troubleshooting guides. They may disassemble the appliance to examine its parts. To check electric systems, repairers follow wiring diagrams and use testing devices, such as ammeters, voltmeters, and wattmeters.

After identifying the problem, the technician makes the necessary repairs or replacements. To fix a portable appliance such as a toaster, the repairer may replace a defective heating element. To fix a major appliance such as a washer, the repairer may replace worn bearings, transmission belts, or gears. To remove old parts and install new ones, repairers use common handtools, including screwdrivers, soldering irons, files, pliers, and special tools designed for particular appliances. After completing a repair, technicians operate the appliance to check their work.

Repairers answer customers' questions and complaints about appliances and frequently advise customers about the care and use of the appliance. For example, they may demonstrate how to load automatic washing machines or arrange dishes in dishwashers.

Appliance technicians may estimate and collect the cost of repairs. They also keep records of parts used and hours worked on each job.

Working Conditions

Repair shops generally are quiet, well lighted, and adequately ventilated. Working conditions outside the shop vary. For example, repairers sometimes work in narrow spaces and uncomfortable positions amidst dirt and dust. Those who repair appliances in homes may spend several hours a day driving.

Although the work generally is safe, technicians must exercise care when handling electrical parts and lifting and moving large appliances. Inexperienced workers are shown

Jobs for appliance installers and repairers are available in nearly every community.

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how to use tools safely and how to avoid electric shock.

Appliance technicians usually work with little or no direct supervision, a feature of the job that appeals to many people.

Employment

Appliance repairers held about 80,000 jobs in 1982, many in independent appliance stores and repair shops. Others worked for service centers operated by appliance manufacturers, department stores, wholesalers, and gas and electric utility companies. About 1 out of 4 repairers is self-employed.

Appliance technicians are employed in almost every community, but are concentrated in the more highly populated areas.

Training, Other Qualifications, and Advancement

Appliance repairers generally learn their trade on the job. Many entrants acquire their skills in other occupations and transfer into appliance repair. Some technicians complete formal training in appliance repair and related subjects in high schools, private vocational schools, and community colleges. No matter how their basic skills are developed, repairers usually get additional training from their employer.

The type of training provided by employers varies among companies. In shops that fix portable appliances, new employees work on a single type of appliance, such as vacuum cleaners, until they master its repair. Trainees then move on to work on a different type of appliance; this process continues until they can repair a variety of appliances. In companies that repair major appliances, beginners may be trained by experienced repairers during repair visits. In other cases, they are taught in the shop while rebuilding used parts such as washing machine transmissions. Up to 3 years of on-the-job training may be needed to become skilled in all aspects of repair of the more complex appliances.

Some large companies such as appliance manufacturers and department store chains have formal training programs, which include home study courses and shop classes, where trainees work with demonstration appliances and other training equipment.

Many repairers receive supplemental instruction through seminars that are conducted periodically by appliance manufacturers. These seminars usually last 1 or 2 weeks and deal with the repair of one of the manufacturer's appliances. To become familiar with new appliances and the proper ways to repair them, experienced repairers attend training classes or study service manuals.

Persons who want to become appliance repairers generally must have a high school diploma. Courses in basic electricity and electronics are desirable because most repairs involve work with electrical equipment, and more and more appliances have electronic components. Mechanical aptitude is also desirable. Appliance technicians who work in customers' homes must be courteous and tactful.

Appliance repairers in large shops or service centers may be promoted to supervisor, assistant service manager, or service manager. A few may advance to managerial positions such as regional service manager or parts manager for appliance manufacturers. Preference is given to those who show ability to get along with coworkers and customers. Experienced repairers who have sufficient funds may open their own appliance stores or repair shops.

Job Outlook

Employment of appliance technicians is expected to grow more slowly than the average for all occupations through the mid-1990's. The number of appliances in use is expected to increase as the number of households grows and new and improved appliances are introduced. But increasing use of electronic parts in appliances should make them more reliable and lessen the need for repairers. Although a smaller than average proportion of appliance repairers leave the occupation, virtually all openings for appliance repairers will arise from the need to replace workers who transfer to other occupations, retire, or die.

Technicians with a strong background in electronics should have the best job prospects. Employment is relatively steady because the demand for appliance repair services continues even during economic downturns.

Earnings

Median weekly earnings of appliance repairers who were not self-employed were $340 in 1982; the middle 50 percent earned between $250 and $425 weekly. The lowest 10 percent earned less than $230, while the highest 10 percent earned over $490. Variations in wages reflect differences in repairers' skill and experience, geographic location, and the type of equipment serviced.

Some appliance repairers belong to the International Brotherhood of Electrical Workers.

Related Occupations

Other workers who service electrical and electronic equipment include air-conditioning mechanics, bowling-pin-machine mechanics, business machine repairers, electric sign repairers, electronic organ technicians, television and radio repairers, and vending machine mechanics.

Sources of Additional Information

For further information about jobs in the appliance service field, contact local appliance repair shops, appliance dealers and utility companies, or the local office of the State employment service.

Information about training programs or work opportunities also is available from:

Association of Home Appliance Manufacturers, 20 N. Wacker Dr., Chicago, Ill. 60606.

International Brotherhood of Electrical Workers, 1200 15th St. NW., Washington, D.C. 20005.

Communications Equipment Mechanics

(D.O.T. 722.281-010; 822.261-010, .281-010, -014, and -034, .361-014, -026, and -030; .381-010 and -022, and .684-010)

Nature of the Work

The ability to communicate quickly and easily is a necessity in modern society. Because communication is vital to a healthy economy, it is essential that the communications system operate smoothly. Installing, repairing, and maintaining the wide array of complex and sophisticated communications equipment are the responsibilities of communications equipment mechanics. Most of this work is done in telephone company central offices by highly specialized workers.

Central office equipment installers, or equipment installation technicians, set up, rearrange, and remove the complex switching and dialing equipment used in central offices. They install equipment in new central offices, add equipment in expanding offices, or replace outdated equipment.

Installers follow work order information, blueprints, circuit diagrams, electrical schematics, and floor plans to position and wire equipment. They often use hoists to lift heavy items, and handtools, such as screwdrivers or soldering guns, to connect equipment once it is in place. For example, they construct and erect iron and steel frames and connect these to the central office equipment. The newer electronic equipment, however, comes in preassembled components and often requires only simple plug-in connections.

After the new equipment has been put in place, installers connect the outgoing and incoming telephone trunklines, consulting diagrams to insure that connections are made correctly. Once this is completed, installers test and troubleshoot the system to see that everything is working correctly. They use communication testing equipment, such as pulsing test sets, oscilloscopes, ohmmeters, and voltmeters, to measure the strength and consistency of the current flow. If the system is not functioning properly, they must determine the cause of the difficulty and correct the malfunction.

Frame wirers, sometimes referred to as frame workers or frame attendants, connect, disconnect, inspect, and repair wires that run from telephone lines and cables to the central office. The frame has many terminal lugs mounted on it, each of which is assigned a specific telephone number. It also contains one pair of wires for each telephone that is connected to that central office. To connect a new telephone, the frame wirer attaches the customer's pair of wires to a set of terminal lugs, using small handtools, such as pliers, screw drivers, and soldering irons. To disconnect a telephone, the frame wirer melts the solder or otherwise removes the wires from the terminal. Frame wirers occasionally change a customer's phone number by reconnecting the customer's pair of wires to a different set of terminal lugs. Frame wirers inspect and repair all parts of the frames after checking for breaks or loose wires. They also may help other craft workers locate and correct malfunctions. To gain experience, frame wirers generally work on residential telephone service. Later, they may work on more complex special services, such as circuitry for large business systems, civil defense warning sirens, or burglar alarms.

Central office repairers, often referred to as central office technicians or switching equipment technicians, test, repair, and maintain all types of local and toll switching equipment that

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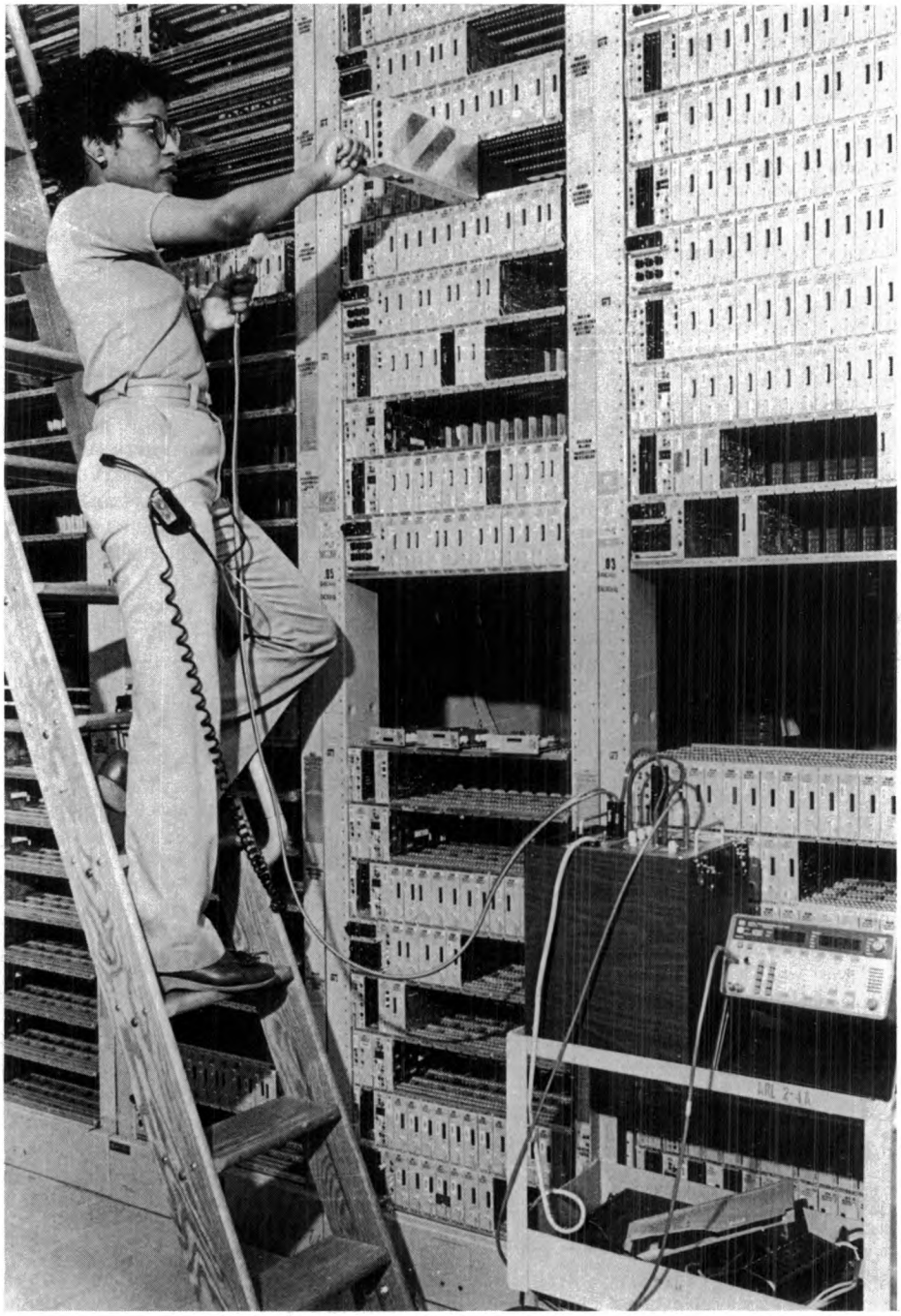
automatically connects lines when customers dial numbers. Most of these switching systems are electromechanical—that is, they contain moving parts and must be cleaned and oiled periodically. Newer switching systems, which are electronic and have no moving parts, must be checked occasionally for breakages.

When customers report trouble with their telephones, *trouble locators* work at special switchboards—sometimes called testboards—to find the source of the problem. To do this, they have the telephone repairer connect a portable phone at various places on the customer's line until a connection can be made to the central office. For a problem at the central office, the trouble locator repeats this procedure with a central office repairer. Trouble locators who work for cable television companies must insure that subscribers' television sets receive the proper signal. They may work with cable installers to track down the cause of the interference and make repairs.

Within the last few years, some telephone companies have started replacing trouble locators with *maintenance administrators*. These workers perform many of the functions of trouble locators but generally do not have as much technical training. Their jobs are largely automated; instead of using test boards and associated equipment to perform the complex circuit testing, they do so by entering instructions into a computer terminal. Maintenance administrators also update and maintain computerized files of trouble status reports.



Communications equipment mechanics generally work in clean, well-lighted, air-conditioned surroundings.

Other communications equipment mechanics include *instrument repairers*, sometimes referred to as shop repairers or shop technicians, who use handtools and power tools to repair, test, and modify communications equipment such as telephones, teletypewriters, and switchboards. In addition, they may paint various types of equipment and cut and weld iron for special work equipment. *Transmission testers* test and operate telephone equipment in central offices that service lines between communities. *Office electricians* make operating adjustments in submarine cable repeater and terminal circuits and related equipment. When trouble arises, they may rearrange cable connections to insure that service is not interrupted. A closely related specialist is the *submarine cable equipment technican*, who repairs, adjusts, and maintains the machines and equipment used in submarine-cable offices or stations to control cable traffic. Some mechanics specialize in working on telegraphic equipment. Called *automatic equipment technicians*, *telegraph plant maintainers*, or *teletype installers*, these workers install, repair, and maintain a variety of transmitting and receiving equipment in telegraph company offices and on customers' premises.

Working Conditions

Because most communications systems operate 24 hours a day, 7 days a week, many communications equipment mechanics have work schedules that include shifts, weekends, and holidays. Where shift work is required, the assignments are made on the basis of seniority. To cope with any emergency that may arise, these workers are subject to 24-hour call. Mechanics generally work in clean, well-lighted, air-conditioned surroundings. Depending on the job, they may have to stand for long periods, climb ladders, and do some reaching, stooping, and light lifting. Some wear headsets most of the time and communicate constantly over telephone circuits with others. Because much of the older communications equipment continually produces sounds, these workers must learn to "block out" noise.

Employment

Communications equipment mechanics held about 92,000 jobs in 1982. Most worked for telephone and telegraph companies. A small number worked for cable television and related companies.

Training, Other Qualifications, and Advancement

Requirements vary by employer. Preference in filling mechanic jobs generally is given to employees already with the company, such as operators, clerical workers, or line installers. Occasionally, trainees are hired from outside. Employees not presently in a craft position and those persons seeking employment from outside the company may be required to take qualification exams. These exams usually test the applicant's arithmetic, verbal, and abstract reasoning skills. In addition, work involving 2-way radio or microwave transmission requires a Federal Communications Commission (FCC)

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general radiotelephone license. Driving may be necessary. If so, a valid State license and good driving record are required.

Because wires are usually color coded, persons who are considering this job should be able to distinguish colors. Physical strength and agility are needed for carrying equipment and climbing and working from ladders, and physical examinations generally are required. In addition to manual dexterity (to work with small tools), applicants should have the analytical skills and judgment to resolve mechanical difficulties. Self-discipline is needed to follow detailed instructions without close supervision. Prospective workers should be able to work as part of a team, since cooperation with others often is essential in solving complex problems. Reading comprehension, logic, and arithmetic ability are helpful in understanding company manuals and circuit wiring diagrams. Verbal skills are needed for those jobs that require interaction with the public and coordination of activities with other employees. A basic knowledge of electricity and electronics and telephone training in the Armed Forces are helpful. Experience in data systems technology or computer maintenance is valuable for work with electronic switching systems.

Trainees generally begin as frame wirers. This is an entry job, and there are no set educational requirements. Although local hiring practices vary, many companies do not require a high school diploma. The ability to read and understand company manuals and work orders is important, however. New workers receive about 6 months of classroom instruction and on-the-job training. Within the past few years, some telephone companies have started to use modular training programs to supplement the more traditional methods of training. Modular training programs include entry tests, videotapes, movies, computer terminals, programmed workbooks that allow employees to learn new skills at their own pace, and tests upon completion of training. Trainees gain practical experience by observing and helping experienced frame wirers. After 1 or 2 years of satisfactory performance, frame wirers may be selected to train for a more skilled job, such as trouble locator, central office repairer, or instrument repairer.

The more demanding repair jobs sometimes are filled by inexperienced entry workers who have previous electrical or electronic experience. More often, however, trainees come from the ranks of the company's frame wirers, telephone installer-repairers, or line installer-repairers. Depending upon the complexity of the equipment to be maintained, companies provide up to 7 months of initial classroom instruction, followed by a lengthy period of on-the-job training. Communications equipment mechanics must continue to study throughout their careers. For example, they return to the classroom from time to time to learn about new types of equipment, which may include electronic switching systems, data transmission equipment, and picturephones.

These workers have a number of opportunities for advancement, which usually involve further technical training. They may be promoted to jobs maintaining more sophisticated equipment, or to jobs as engineering technicians. Some advance to sales or personnel work.

Job Outlook

Overall, little change in employment is expected for communications equipment mechanics through the mid-1990's. However, many job openings will arise each year as experienced workers transfer to other occupations, retire, or leave the occupation for other reasons.

Employment will be subject to conflicting trends through the period. On one hand, technological advances that have made possible new telecommunications services will stimulate the demand for workers to install switching and transmission equipment in new central offices and control centers. In addition, conversion of older electro-mechanical central offices and toll centers to digital electronic switching centers is expected to continue. Advances in mobile telephones and other specialized communications services such as teleconferencing, teletext, videotex, electronic mail, and simultaneous transmission of voice and data over the same channel will generate demand for expanded central offices and toll centers. Deregulation of the telephone industry, along with increasing competition, will continue to allow more firms to build long-distance communications networks that utilize central office equipment. The expansion of cable television systems also will stimulate demand for skilled workers.

Conversion to electronic switching requires fewer installers because much of this equipment is prefabricated and therefore is easier to install. It also permits a greater use of centralized maintenance. As telephone companies use more computer-based support programs to automate central offices, maintenance and repair personnel can be stationed at various control centers. Mobile crews of repairers then can provide the necessary modifications by rotating among several automated central offices. Considerably fewer maintenance and repair workers will be needed with centralized maintenance. Moreover, these new electronically equipped central offices use sophisticated, self-diagnosing test equipment that requires fewer repair and maintenance personnel.

Any decreased labor requirements in central office occupations are not likely to result in layoffs, however. Labor-management cooperation in minimizing the adverse effects of technological change is well established in the telephone industry. The planned use of attrition is a major technique for reducing employment. In addition, unneeded workers are being retrained and transferred to other jobs or localities.

Earnings

Wage rates for communications equipment mechanics vary by employer and locality. In 1982, starting weekly pay for mechanics ranged from about $210 to about $250. Top pay was between $450 and $555. Average hourly earnings for these workers were about $12.50 in 1982, compared to $7.67 for all nonsupervisory workers in private industry, except farming. Since communications equipment mechanics tend to remain in their jobs, most are at or near the top of the pay scale.

Most communications equipment mechanics are members of the Communications Workers of America, the International Brotherhood of Electrical Workers, or the Telecommunications International Union. For these workers, union contracts determine wage rates, wage increases, and the time needed to advance from one step to the next. Contracts also require extra pay for work beyond the normal 8 hours a day or 5 days a week, and for all work on Sundays and holidays. Additional pay for nightwork is provided for in most contracts. Paid vacations are based on time in service. Generally, contracts provide for a 1-week vacation beginning with 6 months of service; 2 weeks for 1 to 6 years; 3 weeks for 7 to 14 years; 4 weeks for 15 to 24 years; and 5 weeks for 25 years and over. Depending on locality, holidays range from 9 to 12 days a year. Other contract provisions include the following: Paid sick leave; group life, medical, and dental insurance; vision care; sickness and accident benefits; retirement and disability pensions; a savings plan; and an employee stock ownership plan.

Related Occupations

Other workers who have the skills needed to do technical, manual work with tools and electrical or electronic machines include computer service technicians, office machine repairers, biomedical equipment technicians, electrical or electronic electricians, and sound technicians.

Sources of Additional Information

For more details about employment opportunities, contact your local telephone or telegraph company or write to:

Communications Workers of America, 1925 K St. NW., Washington, D.C. 20006.

International Brotherhood of Electrical Workers, 1125 15th St. NW., Washington, D.C. 20005.

Telecommunications International Union, 2341 Whitney Ave., Hamden, Conn. 06518.

For more information on the telephone industry and career opportunities in it, request copies of *Phonefacts* and *Is It For You? A Career in the Independent Telephone Industry* from:

United States Independent Telephone Association, 1801 K St. NW., Suite 1201, Washington, D.C. 20006.

Computer Service Technicians

(D.O.T. 828.261-014 and .281-010, 014)

Nature of the Work

Computer systems play a vital role in our lives. They help us make telephone calls, receive paychecks on time, and reserve hotel rooms and tickets for travel and entertainment. In business

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and industry, computer systems perform countless tasks—from maintaining business records to controlling manufacturing processes.

A computer system consists of a central processing unit and additional equipment such as remote terminals, tape and disk storage units, and high-speed printers. Systems vary in size from small personal computers to large mainframe systems that occupy entire floors of office buildings. Keeping this intricate equipment in good working order is the job of the computer service technician.

At regular intervals, computer service technicians (often called field engineers or customer engineers) service machines or systems to keep them operating efficiently. They routinely adjust, oil, and clean mechanical and electromechanical parts. They also check electronic equipment for loose connections and defective components or circuits.

When computer equipment breaks down, technicians must quickly find the cause of the failure and make repairs. Determining where in the system the malfunction has occurred is the most difficult part of the technician's job and requires a logical, analytical mind as well as technical knowledge.

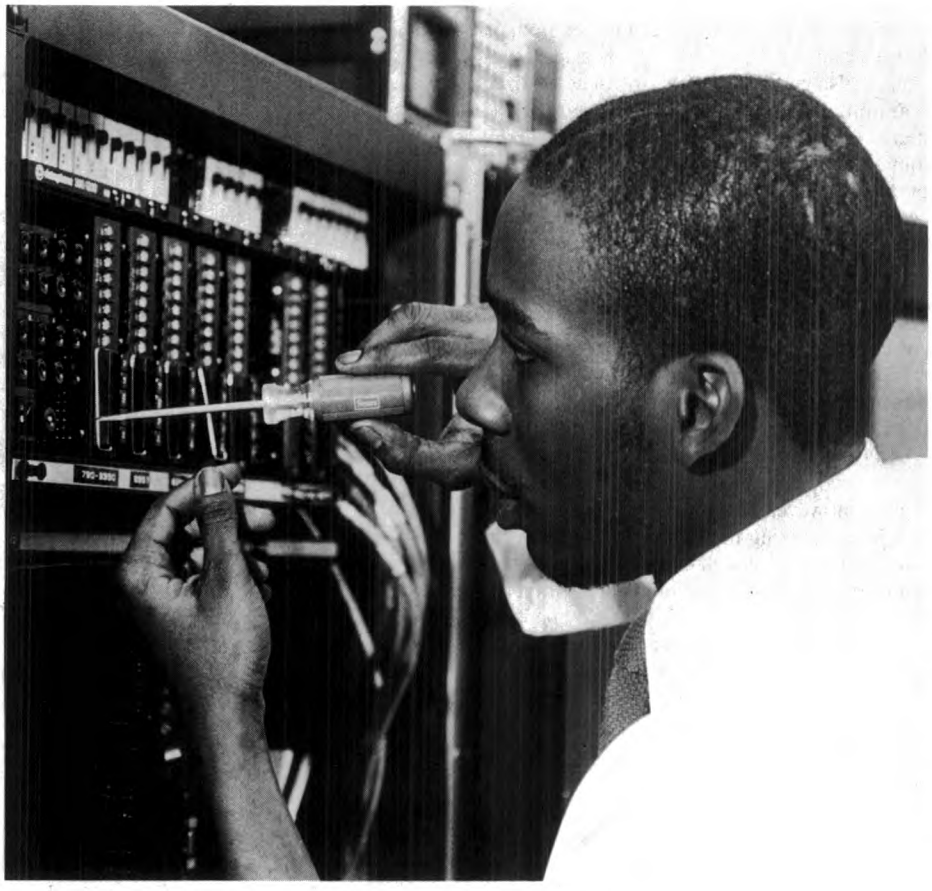
Breakdowns can occur in the central processing unit itself; in one of the peripheral machines, such as a reader or a printer; in minicomputers that are connected to the central unit; or in the cables or data communications hookups that connect these machines. To locate the cause of electronic failures, technicians use several kinds of tools, including voltmeters, ohmmeters, and oscilloscopes. They run special diagnostic programs that help pinpoint certain malfunctions. Although it may take several hours to locate a problem, fixing the equipment may take just a few minutes. To replace a faulty circuit board, solder a broken connection, or repair a mechanical part, technicians use a variety of handtools, including needle-nosed pliers, wirestrippers, and soldering equipment. The employer supplies tools and test equipment, but technicians are responsible for keeping them in good working order.

Computer technicians often help install new equipment. They lay cables, hook up electrical connections between machines, thoroughly test the new equipment, and correct any problems before the customer uses the machine.

Some technicians specialize in maintaining a particular computer model or system, or in doing a certain type of repair. For example, some technicians are experts in correcting problems caused by errors in the computer's internal programming.

Besides knowing how to use specialized tools and test equipment, computer technicians must be familiar with technical and repair manuals for each piece of equipment. They also must keep up with the technical information and revised maintenance procedures issued periodically by computer manufacturers.

Technicians keep a record of preventive maintenance and repairs on each machine they service. In addition, they fill out time and expense reports, keep parts inventories, and order parts.



Computer service technicians install and test new equipment.

Although technicians spend most of their time working on machines, they work with people also. They listen to customers' complaints, answer questions, and sometimes offer technical advice on ways to keep equipment in good condition. In many ways, technicians act as public relations workers for their employer, promoting customer satisfaction and good will. In addition, experienced technicians often help train new technicians and sometimes have limited supervisory duties.

Working Conditions

Large computer installations generally run around the clock, and working time lost because of a breakdown can be very expensive. For this reason, technicians must be available to make emergency repairs at any time, day or night. Although the normal workweek is 40 hours, overtime is commonplace. The method of assigning overtime varies by employer. Some technicians are on call 24 hours a day, others work rotating shifts—days one week, nights the next.

Most technicians are assigned several clients, depending on the technician's specialty and the type of equipment the user has. Workers with several accounts must travel from place to place to maintain these systems and to make emergency repairs. In some cases, more than one technician will share an account and service different parts of a system. In other cases, an experienced technician may be assigned to work full time at a client's installation in order to maintain all phases of that operation.

For most technicians, travel is local; they usually are not away from home overnight. Employers pay for travel, including reimbursement for job-related uses of the technician's car. In some cases the employers provides a car for the technician's use. Technicians who work for a nationwide organization must sometimes transfer to another city or State.

Although some bending and lifting are necessary, the job is not strenuous. Work hazards are limited mainly to minor burns and electric shock, but these can be avoided if safety practices are followed.

Employment

Computer service technicians held about 55,000 jobs in 1982. Most were employed by wholesalers and manufacturers of computer equipment and by firms that provide maintenance services for a fee. A small number were employed directly by organizations that have large computer installations. Computer technicians generally work out of regional offices located in large cities, where computer equipment is concentrated.

Training, Other Qualifications, and Advancement

Most employers require applicants for technician jobs to have 1 to 2 years' post-high school training in basic electronics or electrical engineering. This training may be from a public or private vocational school, a college, or a junior college. Basic electronics training offered by the Armed Forces and by some vocational high schools also is acceptable preparation for some

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technician jobs. Many entrants transfer from other occupations, such as business machine repairer, television service technician, and engineering technician, where a knowledge of electronics provides a good background for work in this field.

A high school student interested in becoming a computer service technician should take courses in mathematics and physics. High school courses in electronics and computer programming also are helpful. Hobbies that involve electronics, such as operating ham radios or building stereo equipment, also provide valuable experience.

Besides technical training, applicants for trainee jobs must have good vision and normal color perception to work with small parts and color-coded wiring. Normal hearing is needed since some breakdowns are diagnosed by sound. Because technicians usually handle jobs alone, they must have the initiative to work without close supervision. Also important are a pleasant personality and neat appearance, since the work involves frequent contact with customers. Patience is an asset, because some malfunctions occur intermittently, making the cause difficult to pinpoint. In some companies, applicants must pass a physical examination. A security clearance may be required in cases where technicians regularly service machines located in restricted buildings, such as Federal Government installations engaged in classified activities.

Newly hired technicians usually receive 3 to 6 months of training from their employer. They may study elementary computer theory, computer math, and circuitry theory in addition to expanding their knowledge of basic electronics. This training includes hands-on experience with computer equipment, doing basic maintenance, and using test equipment to locate malfunctions.

In addition to formal instruction, trainees must complete 6 months to 2 years of on-the-job training. At first, they work closely with experienced technicians, learning to maintain machines that are relatively simple, but that have the basic mechanical and electronic features of more complex equipment. Some companies have trainees gain experience by specializing in a certain type of equipment for a time. When trainees have mastered repair of that device they specialize in another. This process continues till the technician can work with a variety of equipment.

Because manufacturers continually redesign equipment and develop new uses for computers, experienced technicians must attend training sessions to keep up with these changes and to broaden their technical skills. Many technicians take advanced training to specialize in a particular computer system or type of repair. Instruction also may include programming, systems analysis, and other subjects that improve the technician's general knowledge of the computer field.

Experienced technicians with advanced training may become specialists or troubleshooters who help technicians throughout their territory diagnose difficult problems. They also may work with engineers in designing equipment and developing maintenance procedures. Technicians with leadership ability may become supervisors or service managers.

Most computer equipment operates on the same basic principles, but machines built by different companies may be unique in design and construction. For this reason, technicians may find it difficult to transfer between companies that maintain different brands of equipment. However, because of the pressing need for experienced technicians, many opportunities exist for well-qualified workers to transfer to other firms that handle the same type of computer hardware.

Experience in computer maintenance when combined with additional education may also help qualify a technician for a job in equipment sales, programming, or management. (See the statements on programmers and manufacturers' sales workers elsewhere in the *Handbook*.)

Job Outlook

Employment of computer technicians is expected to grow much faster than the average for all occupations through the mid-1990's. As the Nation's economy expands, more computer equipment will be used, and more technicians will be needed to install and maintain it. Business, government, and other organizations will buy, lease, or rent additional equipment to manage vast amounts of information, control manufacturing processes, and aid in scientific research. The development of new uses for computers in fields such as education and medicine also will spur demand.

Employment of service technicians may grow more slowly than in recent years as improvements to computers and related equipment make them more reliable and easier to repair. The latest equipment can diagnose the cause of its malfunctions. For some computer equipment, the diagnosis of the malfunction will be done by another computer via telephone hookup. As computer equipment becomes smaller and more portable, much diagnosis and repair will be done in centralized repair facilities, so that technicians will not have to spend as much time traveling to job sites. These factors will lessen the time needed to make repairs and should slow somewhat the rise in employment.

Despite the faster than average growth in employment, most job openings for technicians will result from the need to replace workers who transfer to other occupations such as service manager, or who leave the labor force.

Computer service technicians have been less likely than other workers to be laid off during downturns in economic activity. However, firms do restrict hiring of new technicians during recessions, making it harder to enter the occupation.

Earnings

Median weekly earnings of full-time computer service technicians were about $430 in 1982. The middle 50 percent earned between $320 and $540. The lowest 10 percent of all technicians earned less than $250 a week. Many of these probably were trainees. The top 10 percent of technicians earned over $665 a week. Technicians earn more in the North and West than in the South.

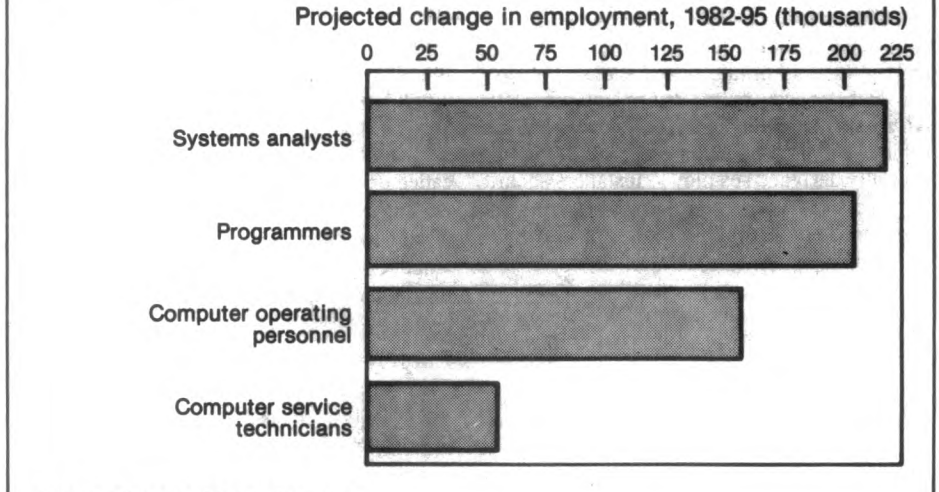
Related Occupations

Workers in other occupations who repair and maintain the circuits and mechanical parts of electronic equipment include appliance repairers, automotive electricians, business machine repairers, electronic organ technicians, instrument repairers, radio repairers, radar mechanics, and television service technicians.

Sources of Additional Information

For general information on careers in computer maintenance, contact the personnel department of computer manufacturers and computer maintenance firms in your area. The State department of education in your State capital can

Among the computer occupations, computer service technicians are expected to have the fewest new jobs.



SOURCE: Bureau of Labor Statistics

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furnish information about approved technical institutes, junior colleges, and other institutions offering postsecondary training in basic electronics.

Additional information about the occupation is available from:

Computer and Business Equipment Manufacturers' Association, Human Resources, 311 1st St. NW., Washington, D.C. 20001.

The State employment service office in your area may also be able to provide information about local job opportunities.

Line Installers and Cable Splicers

(D.O.T. 821.261-010 and -014, .281-010, .361-010, -018, -022, -026, -030, and -038, .687-010; 822.281-030, .361-010, .381-014; 829.361-010 and -014, and .667-010)

Nature of the Work

A vast network of wires and cables links the electric power produced in generating plants to individual customers and connects telephone central offices to each other and to customers' telephones and switchboards. This network is constructed and maintained by line installers and cable splicers and their helpers.

To install new electric power or telephone lines, line installers, often referred to as outside plant technicians or construction line workers, place wires and cables that lead from the central office or generating plant to customers' premises. They usually use power-driven equipment to dig holes and set in the poles that support cables. Line installers climb the poles or use truck-mounted buckets (aerial work platforms) and then use various handtools to attach the cables. When working with electric power lines, installers must bolt or clamp insulators onto the pole before the cable can be attached. They may add other equipment, such as lightning arrestors, transformers, or switches. For both electric power and telephone wires, installers usually leave the ends free for cable splicers to connect later.

In cities where power and telephone lines are below the streets, installers place cables in underground conduits. In many other residential and rural areas, installers use trenchers, plows, and other special power-driven equipment to bury cable directly underground. Submarine cable is installed by using barges or ships and specially designed sea plows. Installers aboard the ship can monitor the plow's progress by television and measure the plow's position and movements by using a telemetry system.

After line installers place cables on poles, towers, or in underground conduits and trenches, cable splicers, also referred to as cable splicing technicians, generally complete the line connections. Splicers work on poles, aerial ladders and platforms, in manholes, or in basements of large buildings. When splicing fiber optic cables, which contain tiny, hair thin glass fibers that transmit voice, data, or video information by light, the delicate connections are made in vans positioned close to the splice point. Splicers connect individual wires or fibers within the cable and rearrange wires when lines have to be changed. They must first read and interpret service orders and circuit diagrams in order to determine the proper splicing specification. Splices are then made by twisting, soldering, or joining wires and cables with small handtools, epoxy, and mechanical equipment. At each splice, they place insulation over the conductor, and seal the splice with a lead sleeve or cover the splice with some other type of protective covering. For example, they may fill the cable sheathing on critical transmission routes with compressed air so that leaks in the sheathing can be monitored and repaired.

Line installers and cable splicers spend much of their time maintaining and repairing telephone and power lines. In some areas, this is done by a separate group of workers called cable repair technicians or cable testing technicians. Installers periodically check to keep the lines clear of dead trees or limbs that could cause problems. Cable splicers routinely check to make sure that insulation on cables is in good condition and that insulators and other equipment on line poles are working properly. This preventive maintenance is extremely important, because a single defect in a cable may interrupt service for many customers. When wires or cables break, or when poles are knocked down or underground ducts collapse, these workers must make emergency repairs as rapidly as possible. These repairs are most common in parts of the country that have hurricanes, tornadoes, earthquakes, and heavy snowfalls.

Working Conditions

Line installers and cable splicers usually work outdoors in all kinds of weather. They must do a lot of climbing and lifting, and often work in stooped and cramped positions. They face hazards such as falls and electric shocks, but these have been greatly reduced by safety precautions developed over the years. For example, workers stringing high-voltage lines must wear rubber gloves. Line installers and cable splicers also must wear safety equipment when entering manholes. In addition, they are required to test for the presence of gas before going underground. These workers are subject to 24-hour call. For example, when severe weather damages telephone or power lines, they may be called upon to work long and irregular hours to restore service. At times they may travel to distant locations—and occasionally stay for a lengthy period to help restore damaged facilities or build new ones.

Employment

Line installers and cable splicers held about 195,000 jobs in 1982. Nearly all worked full time for publicly and privately owned power companies, construction companies specializing in power line construction, and telephone companies.

Training, Other Qualifications, and Advancement

Line installer usually is an entry level job. Although local hiring policies vary, few employers require a high school diploma. High school courses are valuable, however, for developing the reading and arithmetic skills essential for understanding company manuals and work orders. Many employers test applicants for basic verbal, arithmetic, and abstract reasoning skills. In addition, there are entry tests of physical ability such as balance, coordination, and strength. Applicants also may be tested for mechanical aptitude. Knowledge of the basic principles of electricity and training in installing telephone systems with the Armed Forces or vocational education programs may be helpful. Because the work entails a lot of climbing, applicants should have stamina and must be unafraid of heights. The ability to distinguish colors is necessary because wires and cables usually are coded by color. Motivation, self-discipline, and the ability to work as part of a team are needed to work efficiently and safely.

Training programs for line installers and cable splicers include classroom instruction as well as on-the-job training. In addition, some employers are beginning to use other teaching aids to supplement classroom instruction. These may include computer assisted instruction, video cassettes, movies, or "programmed" workbooks. Some classrooms are equipped with actual equipment, such as poles, cable-supporting clamps, and other fixtures to simulate working conditions as closely as possible. Trainees learn to climb poles while keeping their hands free to work. For example, in one classroom exercise, they play catch with a basketball while on the poles. Trainees also are taught safe working practices to avoid falls and contact with power wires. Classroom training, which also includes instruction in electrical codes, blueprint reading, and beginning electrical theory, is followed by on-the-job training. Trainees are assigned to a crew to work with experienced line installers under a line supervisor.

In addition to the training by employers, line and cable workers may attend a training school provided by manufacturers who sell cable installation equipment to telephone or electric power companies. At other times, manufacturers send instructors to the job site.

Some small companies, particularly those in rural areas, do not have adequate facilities to train their employees. Therefore, they may rely on local vocational and technical schools to provide classroom training to craft employees.

Line installers and cable splicers continue to receive training throughout their careers to qualify for more difficult assignments and to keep up with technological changes. For example, crews of cable splicers are introduced to the techniques of fiber optic cable splicing by having several days of training and several additional days of field supervision. They may receive this continuing education not just from their employer, but also from short courses in colleges, universities, private firms, and State telephone associations.

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For installers, advancement may come about through promotion to splicer, telephone installer or repairer, or communications equipment mechanic. Promotion to a supervisory position is also possible.

Cable splicers may transfer to other highly skilled jobs—in the telephone industry, for example, cable splicers can advance to central office equipment installer or PBX installer—or may move into other kinds of work, such as sales. Promotion also is possible to crew supervisor or instructor of new employees.

Job Outlook

Employment of line installers and cable splicers is expected to grow about as fast as the average for all occupations through the mid-1990's. Most openings will be to replace workers who transfer to other occupations, retire, or stop working for other reasons.

A growing and increasingly mobile population will require more telephone and electric power lines. Building these new cable systems and modernizing and maintaining existing systems will require many more line installers and cable splicers.

Despite the strong demand for telephone services and electricity, technological advances that improve productivity should keep employment from rising as fast as demand. For example, improvement such as plows that can dig a trench in a single operation have eliminated much of the heavier physical work of the linecrews and have caused reductions in crew size. Also, satellites and other electronic devices such as microwave systems are expected to carry an increasing volume of telephone traffic, thus reducing the emphasis on cable installation. New kinds of splices and the telephone splicing van that uses a self-contained engine to heat and ventilate manholes and drive power tools and equipment also will continue to improve the efficiency of cable splicers.

Although improved technology has reduced labor requirements in some occupations, layoffs are rare. Unneeded workers usually are given a choice of transferring to other geographic areas where they are needed, or of being placed in a different job in the same area. Telephone and electric power companies lay off workers only as a last resort and have done so infrequently in recent years. The policy of preference for company employees may, however, limit the number of job openings available to others.

Line installers and cable splicers may have to work long and irregular hours to restore service after a storm.

Earnings

Pay rates for line installers and cable splicers vary greatly across the country; specific information may be obtained from local telephone and electric power companies. Earnings also depend on length of service. It generally takes about 5 years to go from the bottom to the top of the pay scale. Beginning weekly salaries for members of a line crew ranged from $220 to $245 in 1982. The most experienced workers earned salaries that ranged from $480 to $620. Because of low job turnover in these occupations, many workers earn salaries near the top of the pay scale, which is about twice the average for all nonsupervisory workers in private industry, except farming.

Most line installers and cable splicers belong to unions, principally the Communications Workers of America, the International Brotherhood of Electrical Workers, and the Telecommunications International Union. For these workers, union contracts set wage rates, wage increases, and the time needed to advance from one step to the next. These contracts require extra pay for work beyond the normal 8 hours a day or 5 days a week, and for all work on Sundays and holidays. Most contracts provide for additional pay for nightwork. Time in service determines the length of paid vacations. In general, contracts provide for a 1-week vacation beginning with 6 months of service; 2 weeks for 1 to 6 years; 3 weeks for 7 to 14 years; 4 weeks for 15 to 24 years; and 5 weeks for 25 years and over. Depending on the locality,there are 9 to 12 holidays a year. Other provisions in contracts include many or all of the following: Paid sick leave; group life, medical, and dental insurance; sickness and accident benefits; vision care; retirement and disability pensions; a savings plan; and an employee stock ownership plan.

Related Occupations

Workers in other skilled crafts and trades who do manual work with tools and machines include automobile mechanics, biomedical equipment technicians, carpenters, cement masons, electricians, machinists, plumbers, sound technicians, toolmakers, and welders.

Sources of Additional Information

For more details about employment opportunities, contact the telephone or electric power

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company in your community or local offices of the unions that represent these workers. For general information on line installer and cable splicer jobs, write to:

Communications Workers of America, 1925 K St. NW., Washington, D.C. 20006.

International Brotherhood of Electrical Workers, 1125 15th St. NW., Suite 1201, Washington, D.C. 20005.

Telecommunications International Union, 2341 Whitney Ave., Hamden, Conn. 06518.

Radio and Television Service Technicians

(D.O.T. 720.281, 823.361-010, and 828.261-010)

Nature of the Work

Radio and television service technicians repair a wide range of home electronic products, of which radios and television sets are the most numerous. Stereo components, video and audio tape recorders, video games and disk players, home computers, home security systems, and even electronic organs are repaired by these technicians. Some service technicians specialize in repairing one kind of equipment—for example, television sets or car radios. Others repair several types—television sets, video tape machines, intercoms, and public address systems.

Electronic equipment may fail to operate properly for many reasons, such as worn-out or defective parts, faulty circuits, or poor connections. Service technicians first conduct a routine check to detect common causes such as loose connections or defective components. Talking to customers may help technicians identify the problem.

When routine checks do not locate the trouble, technicians refer to wiring diagrams and service manuals that show connections and provide instructions on how to locate problems. Using test equipment, such as voltmeters, oscilloscopes, signal generators, and frequency counters, they check circuits. For example, they may measure voltages or wave forms in the circuits of a television set for unusual or irregular measurements that indicate the faulty parts. To make repairs, technicians replace faulty parts or make adjustments, such as focusing and converging the picture or correcting the color balance of a television set. In their work, technicians use pliers, soldering irons, wire cutters, and other handtools. Technicians who make customer service calls carry a variety of solid-state components, modules, and other parts that can be easily replaced in the customer's home.

Self-employed service technicians have managerial responsibilities in addition to their regular duties. They have to order equipment and supplies, keep records, and supervise other technicians.

Service technicians usually work alone with little supervision.

Working Conditions

Service technicians work in shops or customers' homes, where working conditions generally are good. They usually work alone and receive little supervision. Technicians who service electronic products in homes may do considerable driving. Potential hazards include electrical shock and strains from lifting and carrying.

Service technicians generally work 40-44 hours per week, usually in 5 or 5 1/2 days.

Employment

Radio and television service technicians held about 80,000 jobs in 1982, about 3,000 fewer than in 1980. This decline reflects the severe dropoff in economic activity during the 1981-82 recession. More than one-half were self-employed, a much larger proportion than in most skilled trades. Most service technicians, either self-employed or working for others, worked in television repair shops and stores that sell and service television sets, radios, and other electronic products.

Radio and television service technicians work in almost every city. Geographically, employment is distributed in much the same way as the Nation's population.

Training, Other Qualifications, and Advancement

Training in electronics—acquired formally or through on-the-job training in another, related occupation—generally is required to get an entry level job as a radio and television service technician. The military services also offer training and work experience that are very useful in civilian electronics work.

Formal training is offered by high schools, private vocational schools, and junior colleges. Programs in these schools include subjects such as mathematics, physics, schematic reading, electricity, and hands-on work with television sets, radios, and other electronic equipment. The training lasts from 1 to 2 years. Additional training in radio and television electronics generally is required by employers.

A few radio and television service technicians complete 3- or 4-year formal apprenticeship programs.

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New technicians usually begin by working in the shop or in the field under the supervision of an experienced worker. Large repair stores may provide in-house training combined with home study to familiarize new workers with particular brands and models of equipment.

Technicians must keep abreast of changes in technology. Manufacturers, employers, and trade associations conduct training seminars to teach technicians how to service new models or products. Technicians also keep up with developments by studying manufacturers' service manuals and technical magazines.

Radio and television service technicians must be able to manipulate small parts and tools, and must have good eye-hand coordination, normal hearing, and good eyesight and color perception. Courtesy and tact are essential in dealing with customers.

Some States require radio and television technicians to be licensed. To obtain a license, applicants must pass an examination designed to test their knowledge of electronic circuits and components and their skill in the use of testing equipment.

Service technicians who work in large repair shops may be promoted to supervisor or service manager. Some technicians obtain jobs as electronics "troubleshooters" in manufacturing industries or government agencies. Those interested in advancing to positions such as electronics technician can improve their opportunities by taking courses in automatic controls, electronic engineering, television engineering, and mathematics.

Technicians who have sufficient funds may open their own service shops. Those planning to go into business for themselves should take some business administration courses, particularly accounting and consumer relations.

Job Outlook

Employment of radio and television service technicians is expected to increase about as fast as the average for all occupations through the mid-1990's. Some of this growth reflects a rebounding of employment to pre-recession levels.

Employment of service technicians is expected to increase in response to the growing number of television sets, video games, home computers, disk players, radios, phonographs, tape recorders, and other home entertainment products. Rising population and personal incomes will contribute to this growth. Closed-circuit television, which is being used increasingly to monitor production processes in manufacturing plants, protect buildings, and to bring educational programs into classrooms, will create additional demand for service technicians. Improvements in technology that reduce service requirements, however, will keep employment from rising as fast as otherwise would be expected.

Despite the rising demand for these workers, the need to replace workers who leave the occupation will account for most job openings. Because experience in radio and television electronics is good preparation for other jobs—business machine repairer, computer service technician, broadcast technician, for example—an unusually large proportion of radio and television service technicians transfer to other occupations.

Earning

Median earnings of radio and television service technicians who are not self-employed were about $300 a week in 1982; the middle 50 percent earned between $250 and $450 weekly. The lowest 10 percent earned less than $180, while the top 10 percent earned more than $550. The wide variation in wage rates reflects differences in skill levels, types of employers, and geographic location.

A few service technicians are members of labor unions. Most of these belong to the International Brotherhood of Electrical Workers.

Related Occupations

Other occupations in which workers repair electronic equipment include appliance repairers, business machine repairers, computer service technicians, and electronic organ technicians.

Sources of Additional Information

For more information about jobs in this field, contact local shops and stores that service radio and television sets and other electronic equipment. Technical and vocational schools that offer courses in radio and television repair or electronics may provide information about training. In addition, locals of the International Brotherhood of Electrical Workers and the local office of the State employment service may have information about programs that provide training opportunities.

Information about the work of radio and television service technicians is available from:

National Association of Television and Electronic Servicers of America (NATESA), 5930 S. Pulaski Rd., Chicago, Ill. 60629.

Electronics Industries Association, 2001 Eye St. NW., Washington, D.C. 20006.

National Electronic Sales and Service Dealers Association and the International Society of Certified Electronics Technicians, 2708 West Berry St., Fort Worth, Tex. 76109.

Telephone and PBX Installers and Repairers

(D.O.T. 822.261-022, .281-018 and -022, .361-014, and .381-018)

Nature of the Work

Telephone and PBX installers and repairers are craft workers who install, service, and repair telephones, switchboard systems, mobile radio and microwave systems, and other communications equipment on customers' property. Often referred to as services and systems technicians, they generally travel to customers' homes and offices in vehicles equipped with telephone tools and supplies. Before making any installations or repairs, they read and interpret service orders, technical manuals, and circuit wiring diagrams. They also keep detailed and accurate records of all work activity. When customers move or request new types of service, installers relocate telephones or make changes on existing equipment. For example, they may install a switchboard in an office, or change a two-party line to a single-party line in a residence. Installers also may add an extension in another room or replace an old telephone with a new model. After installation, they test the equipment to make sure that it is working properly. In some areas, these workers may handle special cases such as public service commission complaints, illegal or unauthorized use of equipment, and electric or acoustic shocks. Many installers and repairers promote improved customer service by demonstrating various kinds of telephone equipment or services.

Telephone installers, sometimes called station installers, install, rearrange, and remove telephones in homes and business places. They assemble equipment and install wiring at the customers' premises using a variety of handtools. They connect telephones to outside service wires and sometimes must climb poles or ladders to make these connections. Occasionally, especially in apartment buildings, the service wires or terminals are in the basement of the building. In many large building complexes, these wires or terminals are located in wire closets.

PBX installers, also called systems technicians, specialize in more complex telephone system installations. Using equipment that includes handtools, signal generators, ohmmeters, and oscilloscopes, these workers connect wires from terminals to switchboards and power cabinets and make tests to check their installations. Some PBX installers also set up equipment for the wire and microwave transmission of mobile radiotelephones, picturephones, ship to shore communications, data processing, and telephone switchboard systems for radio and television broadcasts that receive phone calls from the audience.

Telephone repairers test, clean, fix, or replace faulty equipment. Working closely with trouble locators in the central office, they locate and analyze trouble on customers' equipment and in outdoor public facilities. A repairer finds the source of the problem by connecting a test set to the customer's telephone line and then testing in conjunction with the trouble locator in the central office.

PBX repairers, with the assistance of trouble locators, locate the malfunction in customers' PBX, CENTREX, KEY, or other telephone systems and make the necessary repairs. They also maintain associated equipment such as batteries, relays, and powerplants. Some PBX repairers maintain and repair equipment for radio and television broadcasts, mobile radiotelephones, microwave transmission equipment, switching equipment, and data processing equipment.

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Telephone installers usually are chosen from the ranks of telephone company employees.

Working Conditions

Telephone and PBX installers and repairers work in many kinds of places, both indoors and outdoors, and in all kinds of weather. Their work involves lifting, climbing, reaching, stooping, crouching, and crawling. They must not be afraid to work in high places such as rooftops and microwave towers. Because telephone service must be maintained at all times, these workers are subject to 24-hour call, as are all telephone company employees. Workers also may be required to work evening and night shifts. Because breakdowns in lines or equipment can occur at any time, work on holidays and on nonscheduled days may be required.

Employment

Telephone and PBX installers and repairers held about 134,000 jobs in 1982. The vast majority worked full time.

Training, Other Qualifications, and Advancement

Trainees usually are chosen from the ranks of telephone company employees such as operators, clerical workers, and line installers. A basic knowledge of electricity and electronics gained from previous employment experience or schooling, and telephone training in the Armed Forces, are assets in being accepted for training. In addition, applicants must have good eyesight and the ability to distinguish colors. Physical examinations may be required because the work may involve strenuous activities such as climbing poles and lifting and carrying heavy objects. Good balance is necessary in order to work in high places and for crouching or stooping in cramped areas. Practical problem-solving ability is essential, as in all repair jobs. Because these workers deal with the public, a pleasant and patient disposition is an advantage.

Applicants for telephone installer or repairer jobs must have the ability to learn a craft, and may have to take a mechanical aptitude test as well as tests that measure mathematical skills. Workers in these jobs must be adept at handling small tools, such as pliers and screwdrivers, and know how to read blueprints and interpret work orders and circuit diagrams. Local hiring practices vary, but many employers no longer require a high school diploma for telephone craft jobs. However, applicants must be able to read and understand company manuals and directions for telephone installation and repair.

Telephone installer-repairer trainees receive classroom instruction in subjects such as electrical and electronic theory. Practical instruction is provided in training facilities equipped with telephone poles, lines and cables, terminal boxes, and other equipment. There, in a simulated work environment, trainees practice installing telephones and connecting wires just as they would on the job. After several weeks of classroom training, new employees are assigned to assist experienced workers before going out alone to install telephones.

Because many small telephone companies, especially in rural areas, do not have training facilities, they use vocational and technical schools in these areas to train telephone installers and repairers. If travel is required during training—to a regional training school, for example—the company pays the cost.

In recent years, some telephone companies have begun to use modular training programs for their workers. Modular training is used to supplement other, more traditional forms of training. Training modules may include some or all of the following: Entry tests; video modules such as computer terminals, movies, and video cassettes; programmed workbooks; exit tests; and skill mastery tests where the trainee demonstrates the skills he or she has learned. Workers using training modules can learn various aspects of their craft at their own convenience and pace.

PBX installer or repairer jobs require previous training and experience in the installation of communication equipment. These are not entry level jobs. Often, the necessary experience has been obtained as an installer-repairer of telephones in private homes. As newer PBX systems require more knowledge of electronics and familiarity with computer software on the part of the installation and repair workers, some telephone companies are beginning to require applicants to demonstrate a knowledge of electronics. After 2 to 4 weeks of initial classroom training, new PBX installers usually begin to work with basic PBX equipment and gradually learn, through classroom and on-the-job training, to install increasingly complex equipment. Further advancement to PBX repairer requires more experience and additional classroom training. PBX installer-repairers who work on radiotelephone or any other 2-way communications equipment must have an FCC general radiotelephone operator license (second class license) or acquire one within a short time period (usually 6 months) after assignment.

Telephone craft workers receive training throughout their careers to qualify for more responsible assignments and to keep up with technological changes. Courses are offered by colleges, universities, private firms, and State telephone associations, as well as by the telephone companies themselves. With further training, telephone installer-repairers can advance to supervisor, to sales and customer service jobs or, with additional study of electronics, to more advanced technical jobs such as PBX installer or switching equipment technician.

Job Outlook

Employment of telephone and PBX installers and repairers is expected to increase about as fast as the average for all occupations through the mid-1990's. Although turnover is usually low in this occupation, most of the openings result from the need to replace persons who transfer to other occupatons, retire, or leave the labor force for other reasons.

Technological improvements will result in differing employment trends for those working on telephones and those specializing in PBX and other sophisticated equipment. Employment of telephone installers and repairers will grow only moderately as this work becomes less labor intensive. For example, changes such as pre-wired buildings that enable the customer

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to select a telephone, take it home, and plug it in have effectively eliminated the functions of the installer. The modular assembly of telephones, where components plug in and out, also has reduced the time and skills needed for repair. However, more telephone repairers may be needed to repair phone units within the growing number of business telephone systems. In addition, communities near military bases or colleges, where there is substantial movement in and out, will continue to provide relatively strong demand for telephone installation and removal. Openings for telephone installers and repairers usually are filled by workers in other telephone jobs, such as operators, service representatives, line installers, clerks, or drivers. As technology continues to displace telephone workers, competition for these openings should intensify, making it more difficult for "outsiders" to compete for jobs.

On the other hand, employment of PBX installers and repairers is expected to increase substantially due to the growing demand for more sophisticated telephone services such as PBX, KEY, and CENTREX systems, advanced mobile radiotelephones, energy control systems, computer data networks, satellites and microwave radio systems, advanced video systems, teletext, videotex, and electronic mail. The increasing utilization of these sophisticated systems is expected to outweigh the reduction in labor requirements resulting from gains in productivity. Because this is not an entry level occupation, most openings will be filled by other telephone workers. Employment is expected to increase most rapidly in the Southwest and other areas where the population is growing rapidly.

Earnings

Pay scales vary greatly across the country; specific information may be obtained from local telephone companies. Earnings also depend on length of service. Generally, it takes about 5 years to progress from the beginning rate to the top of the pay scale. In 1982, average hourly pay for telephone and PBX installers and repairers was $13.02. By comparison, average hourly earnings for nonsupervisory workers in all private industries, except farming, were $7.67. Starting weekly pay rates for telephone installers and repairers ranged from $220 to $240 in 1982. The typical top pay range was $480 to $520. For PBX installers and repairers, the beginning weekly pay typically ranged from $235 to $260, while the highest pay rates ranged from $500 to about $550. Because there is relatively little turnover in these occupations, most telephone and PBX installers and repairers are near or at the top of the pay scale.

Most telephone and PBX installers and repairers belong to unions, principally the Communications Workers of America, the International Brotherhood of Electrical Workers, and the Telecommunications International Union. Union contracts govern wage rates, wage increases, and the time needed to progress from one grade to the next. Contracts stipulate extra pay for work performed beyond the normal 8 hours a day or 5 days a week, as well as for that performed on holidays and Sundays. Most contracts provide a pay differential for nightwork. Paid vacations are granted according to length of service. Normally, contracts provide for a 1-week vacation beginning with 6 months of service; 2 weeks for 1 to 6 years; 3 weeks for 7 to 14 years; 4 weeks for 15 to 24 years; and 5 weeks for 25 years and over. Depending on the locality, holidays range from 9 to 12 days a year. Other benefits include the following: Paid sick leave; group life, medical, and dental insurance; vision care; sickness and accident benefits; retirement and disability pensions; a savings plan; and an employee stock ownership plan.

Related Occupations

Other skilled workers whose jobs require manual dexterity and technical knowledge of tools and machines include automobile mechanics, biomedical equipment technicians, carpenters, cement masons, electricians, machinists, plumbers, sound technicians, toolmakers, and welders.

Sources of Additional Information

For more details about employment opportunities, contact the telephone company in your community or local offices of the unions that represent telephone workers. For general information on telephone and PBX installer and repairer jobs, write to:

Communications Workers of America, 1925 K St. NW., Washington, D.C. 20006.

International Brotherhood of Electrical Workers, 1125 15th St. NW., Washington, D.C. 20005.

Telecommunications International Union, 2341 Whitney Ave., Hamden, Conn. 06518.

For additional information on the telephone industry and career opportunities in it, request copies of *Phonefacts* and *Is It for You? A Career in the Independent Telephone Industry* from:

United States Independent Telephone Association, 1801 K St. NW., Suite 1201, Washington, D.C. 20006.

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Air-Conditioning, Refrigeration, and Heating Mechanics

(D.O.T. 637.261-010, -014, -018, -026, and -030, and .381-010, -014; 827.361-014; 862.281-018, .361-010; and 869.281-010)

Nature of the Work

People always have sought ways to make their environment more comfortable. Today air-conditioning and heating systems control the temperature, humidity, and even the cleanliness of the air in homes, offices, factories, and schools. In addition, refrigeration systems make it possible to safely store food, drugs, and other perishable items. Air-conditioning, heating, and refrigeration mechanics are skilled workers who install, maintain, and repair such systems.

Air-conditioning, heating, or refrigeration requires more than a single machine. In central air-conditioning systems, for example, fans, compressors, condensers, and evaporators work to cool and dehumidify the air. Metal and fiberglass ducts or special piping distribute the treated air throughout the building. Mechanics must be able to work with the complete system—the ducts and pipes as well as all the machinery.

Mechanics may specialize in installation or in service—maintenance and repair. Some work only with certain equipment, such as gas furnaces or commercial refrigerators. However, mechanics may do both installation and service and work with cooling, heating, and refrigeration equipment. The following are some specific jobs in this field.

Air-conditioning and refrigeration mechanics install and service central air-conditioning systems and a variety of refrigeration equipment. For air-conditioning or refrigeration systems, mechanics follow blueprints, design specifications, and manufacturers' recommended procedures to install motors, compressors, condensing units, evaporators, and other components. They connect this equipment to the duct work, refrigerant lines, and electrical power source. After making the connections, they charge the system with refrigerant if necessary and check it for proper operation.

When air-conditioning and refrigeration equipment breaks down, mechanics diagnose the cause and make repairs. To find defects, they test parts such as compressors, relays, and thermostats. During the winter, air-conditioning mechanics inspect the systems and do required maintenance, such as overhauling compressors. Some air-conditioning and refrigeration mechanics also service heating systems.

Furnace installers, also called heating equipment installers, follow blueprints or other specifications to install oil, gas, electric, solid-fuel, and multifuel heating systems. After setting the furnace in place, they install fuel supply lines, air ducts, pumps, and other components. They then connect electrical wiring and controls, and check the unit for proper operation.

Oil burner mechanics keep oil-fueled heating systems in good operating condition. During the fall and winter, when the system is needed most, they service and adjust oil burners. If a system is not operating properly, mechanics check the thermostat, burner nozzles, controls, and other parts to locate the problem. The mechanic corrects the problem by adjusting or replacing parts. During the summer, mechanics do maintenance work, such as replacing oil and air filters and vacuum-cleaning vents, ducts, and other parts of the heating system that accumulate soot and ash.

Gas burner mechanics, also called gas appliance servicers, have duties similar to those of oil burner mechanics. During the winter, they locate malfunctions in gas-fueled heating systems and make necessary repairs and adjustments. During the summer, they inspect and clean the heating system to prepare it for the heating season. Some mechanics also repair cooking stoves, clothes dryers, hot water heaters, and outdoor lights and grills.

Air-conditioning, refrigeration, and heating mechanics use a variety of tools, including hammers, wrenches, metal snips, electric drills, pipe cutters and benders, and acetylene torches, to work with refrigerant lines and air ducts. They use volt-ohmmeters, manometers, and other testing devices to check electrical circuits, burners, and other components.

Cooling and heating systems sometimes are installed or repaired by other craft workers. For example, on a large air-conditioning installation job, especially where workers are covered by union contracts, duct work might be done by sheet-metal workers; electrical work by electricians; and installation of piping, condensers, and other components by pipefitters. Room air-conditioners and household refrigerators are serviced by appliance repairers. Additional information about these occupations appears elsewhere in the *Handbook*.

Air-conditioning mechanics use gauges to check equipment during installation.

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Working Conditions

Mechanics work in homes, office buildings, factories—anywhere there is climate control equipment. They carry their tools and some spare parts to the job sites in trucks and are dispatched to jobs by radio or telephone. For major repairs, mechanics transport broken machinery or parts to the repair shop.

Mechanics may work outside in cold or hot weather or in buildings that are uncomfortable because the air-conditioning or heating equipment is broken. Mechanics often work in awkward or cramped positions and sometimes are required to work in high places. Hazards in this trade include electrical shock, torch burns, muscle strains, and other injuries from handling heavy equipment.

Employment

Air-conditioning, heating, and refrigeration mechanics held 168,000 jobs in 1982, nearly 4,500 less than in 1980. This decline reflects the slump in construction activity associated with the 1981-82 recession.

Cooling and heating contactors employed most air-conditioning and refrigeration mechanics and furnace installers. Fuel oil dealers employed most oil burner mechanics, and gas utility companies, most gas burner mechanics. Mechanics also work for foodstore chains, school systems, manufacturers, and other organizations that operate large air-conditioning, refrigeration, or heating systems. Approximately 1 out of 5 mechanics is self-employed.

Air-conditioning and refrigeration mechanics, gas burner mechanics, and furnace installers work in all parts of the country. Generally, the geographic distribution of these workers is similar to that of the population. Oil burner mechanics are concentrated in the northeastern States where oil is a major heating fuel.

Training, Other Qualifications, and Advancement

Many air conditioning, refrigeration, and heating mechanics start as helpers and acquire their skills by working for several years with experienced mechanics. New workers usually begin by assisting experienced mechanics and doing simple jobs. They may carry materials, insulate refrigerant lines, or clean furnaces. In time, they do more difficult jobs, such as cutting and soldering pipes and sheet metal and checking electrical circuits. In 4 to 5 years, new mechanics are capable of doing all types of repairs and installations.

Many high schools, private vocational schools, and junior colleges offer programs in air-conditioning, heating, and refrigeration. Students study air-conditioning, heating, and refrigeration theory and the design and construction of the equipment. They also learn the basics of installation, maintenance, and repair. Although completion of such a program does not assure a job, employers may prefer to hire graduates of these programs because they require less on-the-job training. These programs also help students determine if they have an interest and aptitude for the trade.

Apprenticeship programs are run by local joint apprenticeship committees made up of locals of the United Association of the Plumbing and Pipefitting Industry and some local chapters of the Air-Conditioning Contractors of America and by local chapters of the Associated Builders and Contractors. In addition to on-the-job training, apprentices receive 144 hours of classroom instruction each year in related subjects, such as the use and care of tools, safety practices, blueprint reading, and air-conditioning theory. Applicants for apprenticeships must meet requirements of local apprenticeship committees; for example, they may have to have a high school diploma or pass a mechanical aptitude test. Apprenticeships last 4 years.

When hiring helpers, employers prefer high school graduates with mechanical aptitude who have had courses in shop math, mechanical drawing, electricity, and blueprint reading. Many of these people have prior work experience. Good physical condition is necessary because workers sometimes have to lift and move heavy equipment.

To keep up with changes in technology and to expand their skills, experienced mechanics may take courses offered by associations such as the Refrigeration Service Engineers Society, the Petroleum Marketing Education Foundation, and the Air Conditioning Contractors of America.

Mechanics can advance to positions as supervisors. Those with sufficient money and managerial skill can open their own contracting businesses.

Job Outlook

Employment of air-conditioning, refrigeration, and heating mechanics is expected to increase faster than the average for all occupations through the mid-1990's. Some of this growth reflects a rebounding of employment to prerecession levels. Employment will increase as more homes and commercial and industrial buildings are constructed. Installations of new energy-saving heating and air-conditioning systems in existing homes and buildings also will increase employment of mechanics. Most job openings, however, will result from the need to replace workers who transfer to other occupations, retire, or leave the occupation for other reasons.

Employment of air-conditioning, heating, and refrigeration mechanics usually is not as sensitive to downturns in the economy as some other construction occupations because maintenance of existing systems and installation of new, more efficient equipment in existing buildings make up a large part of their work. Because people and businesses depend on their air-conditioning, heating, and refrigeration systems, the need for mechanics to do maintenance work is relatively strong even during economic downturns.

Because the high earnings and good job prospects of this trade attract many people, beginning mechanics may face competition for jobs as helpers or apprentices. Graduates of training programs that emphasize hands-on experience and those with related work experience will have an advantage in getting a job.

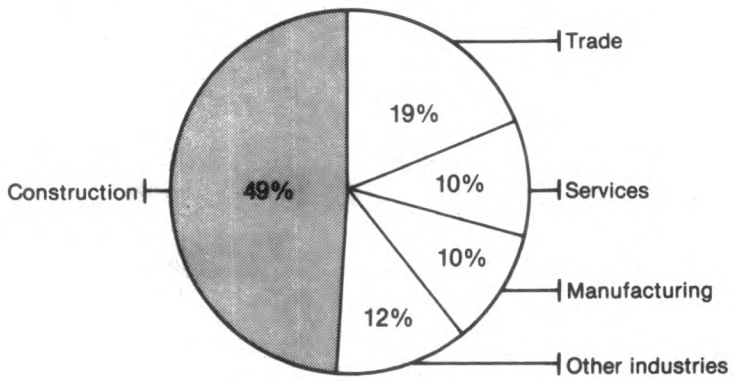
Earnings

Median weekly earnings of air-conditioning, heating, and, refrigeration mechanics who were not self-employed were $360 in 1982. The middle 50 percent earned between $270 and $465. The lowest ten percent earned less than $205 a week, and the same proportion earned more than $610 a week.

Hourly rates for experienced air-conditioning, refrigeration, and heating mechanics working under union contracts ranged from $12 to $15 in 1982. In comparison, all production and nonsupervisory workers in private industry, except farming, averaged $7.67 an hour. Apprentices receive a percentage of the wage paid experienced workers, about 40 percent at the beginning of their training and about 85 percent during the fourth year. Mechanics who work on

About half of all air-conditioning, refrigeration, and heating mechanics hold jobs in the construction industry.

Distribution of wage and salary employment, 1982



SOURCE: Bureau of Labor Statistics

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both air-conditioning and heating equipment frequently have higher rates of pay than those who work on only one type of equipment.

Mechanics usually work a 40-hour week. However, during peak seasons they often work overtime or irregular hours. Most employers try to provide a full workweek the year round, but they may temporarily reduce hours or lay off some mechanics when the season is over. Employment in most shops that service both air-conditioning and heating equipment is fairly stable throughout the year.

Some mechanics are members of the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry or the Sheet Metal Workers International Association.

Related Occupations

Air-conditioning, heating, and refrigeration mechanics work with sheet metal and piping, and repair machinery, such as electrical motors, compressors, and burners. Other workers who have similar skills are boilermakers, electrical appliance servicers, electricians, pipefitters, plumbers, and sheet metal workers.

Sources of Additional Information

For more information about employment and training opportunities in this trade, contact local air-conditioning refrigeration, and heating contractors; a local of the unions previously mentioned; a local joint union-management apprenticeship committee; a local chapter of the Associated Builders and Contractors; or the nearest office of the State employment service or State apprenticeship agency.

For information on career opportunities and training, write to:

Air-Conditioning and Refrigeration Institute, 1815 N. Fort Myer Dr., Arlington, Va. 22209.

Air Conditioning Contractors of America, 1228 17th St. NW., Washington, D.C. 20036.

Associated Builders and Contractors, 729 15th St. NW., Washington, D.C. 20005.

Refrigertion Service Engineers Society, 1666 Rand Rd., Des Plaines, Ill. 60016.

For information about training in oil heating systems, write to:

Petroleum Marketing Education Foundation, P.O. Box 11187, Columbia, S.C. 29211.

Coin Machine Servicers and Repairers

(D.O.T. 639.281-014)

Nature of the Work

Coin-operated machines have become a familiar part of everyday life. In places of recreation, work, and education, these machines provide many types of entertainment, food, and refreshments, from a piece of candy or a complete meal to games of skill. Coin machine mechanics keep these machines in good working order. They generally specialize in either merchandize vending machine repair or amusement machine repair.

Before new machines are placed on location for use, mechanics make sure they operate correctly. When checking complicated electrical and electronic machines, such as beverage dispensers, they make sure that the machines mix drinks properly and that refrigerating and heating units work correctly. They test electronic games for proper operation prior to installation. On the relatively simple gravity-operated machines, mechanics check handles, springs, plungers, and merchandise chutes. They also test coin and change-making mechanisms. When installing machines on location, mechanics make the necessary water and electrical connections and recheck the machines for proper operation.

If a machine breaks down, mechanics must determine the cause of the trouble. They first inspect the machine for obvious problems, such as loose electrical wires, malfunctions of the coin mechanism, and leaks. If the problem cannot be readily located, they may refer to troubleshooting manuals and wiring diagrams and use testing devices such as electrical circuit testers to find defective parts. Mechanics may repair faulty parts at the site. However, they often install replacements and take broken parts to the company shop for repair.

Preventive maintenance—avoiding trouble before it starts—is another major part of the job. For example, mechanics periodically clean electrical contact points, lubricate mechanical parts, and adjust machines to perform properly.

In repair and maintenance work, mechanics who repair vending machines use pipe cutters, soldering irons, wrenches, screwdrivers, hammers, and other handtools. In the repair shop, they may use power tools, such as grinding wheels, saws, and drills. Those who repair electronic amusement machines may use voltmeters, ohmmeters, and oscilloscopes to repair electronic panels.

Because many vending machines dispense food, mechanics must know State and local public health and sanitation standards as well as those established under local plumbing codes. They also must know and follow safety procedures, especially when lifting heavy objects and working with electricity and gas.

Mechanics must do some clerical work, such as filing reports, preparing repair cost estimates, and ordering parts. Those employed by small operating companies may service as well as repair machines. These combination "mechanic-routeworkers" stock machines, collect money, fill coin and currency changers, and keep daily records of merchandise distributed.

Working Conditions

Some mechanics work in company repair shops, others work in the field, but many do both. Since coin machines can be operated around the clock, mechanics sometimes work at night and on weekends and holidays.

Coin machine repair shops generally are quiet, well lighted, and have adequate work space. However, when servicing machines on location, mechanics may work where pedestrian traffic is heavy or work in noisy, crowded game arcades. Repair work is relatively safe, although mechanics are subject to hazards such as electrical shocks and cuts from sharp tools and metal objects.

Employment

Coin machine servicers and repairers held about 31,000 jobs in 1982. Some repairers work for vending companies that sell food and other items through machines. Some work for soft drink bottling companies that have their own

Mechanics often make repairs on the customer's premises.

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coin-operated machines. Others work for manufacturers and distributors of electronic games. Other mechanics, who are employed as instructors by machine manufacturers, teach mechanics to repair new machines. Although mechanics are employed throughout the country, most are located in areas with large populations where there are many coin machines.

Training, Other Qualifications, and Advancement

Coin machine servicers who repair electronic games generally are reqired to have an associate degree in electronics, including training or relevant work experience in computer microprocessors. Equivalent military training is also acceptable. Most vending machine repairers, however, enter this occupation as general shop helpers or route drivers, where they learn informally on the job by observing, working with, and receiving instruction from experienced mechanics. Trainees usually start out by doing simple jobs such as cleaning, painting, or refurbishing machines. From there, they learn to rebuild machines—removing defective parts, repairing, adjusting, and testing the machines. Next, they accompany an experienced mechanic on service calls, and then go out on their own. They call upon the expertise of other mechanics, when necessary. This learning process takes from 6 months to 3 years, depending on the individual's abilities, previous education, and the quality of instruction.

Many beginners are high school graduates, but employers may not require a diploma. High school or vocational school courses in electricity, refrigeration, and machine repair help beginners to qualify for entry jobs. Some vocational high schools and junior colleges offer 1- to 2-year training programs for mechanics. Many schools offer the training in basic electronics that is becoming more important for these workers.

The National Automatic Merchandising Association has established an apprenticeship program to help employers train present and new workers. Apprentices receive periods of training in various skills. The program also calls for 144 hours of related instruction each year in subjects such as basic electricity, blueprint reading, customer relations, and safety. Apprenticeships last 3 years. The NAMA program includes optional certification of mechanics upon completion of their on-the-job training, and passing performance and written tests.

To learn about new machines, mechanics sometimes attend manufacturer-sponsored training sessions in repair shops, or in manufacturers' service facilities. Employers usually pay wages and expenses during these sessions, which may last from a few days to several weeks.

Some employers encourage both trainees and experienced mechanics to take evening courses in subjects related to coin machine operation and repair—for example, basic electricity, electronics, and refrigeration. Employers often pay for at least part of the tuition and book expenses for these courses.

Employers require applicants for mechanic jobs to demonstrate mechanical ability, either through their work experience or by scoring well on mechanical aptitude tests. Since mechanics are exposed to thousands of dollars in merchandise and cash, employers want applicants who have a record of honesty and respect for the law. The ability to deal tactfully with people also is important. A commercial driver's license and a good driving record are essential for most coin machine repairer jobs.

Skilled mechanics may be promoted to supervisory jobs. Some open their own companies.

Job Outlook

Employment of coin machine repairers is expected to grow about as fast as the average for all occupations through the mid-1990's as more coin machines are installed to meet the demand for food and other vending machine items and as more industrial plants, hospitals, and stores move to suburban areas where restaurants are not always close by. In addition, companies will increase the variety of products sold through the machines. The growing number of coin-operated electronic games also will stimulate demand. Job openings also will arise as experienced mechanics transfer to other occupations or leave the labor force.

Persons with some background in electronics should have excellent job prospects, as more electronic components are used in coin machines. Job prospects for workers without experience or vocational training often depend on local job market conditions. If firms need more mechanics and cannot find trained or experienced ones, they are likely to train qualified route drivers or hire inexperienced people who have acquired some mechanical or electrical aptitude by taking high school or vocational courses.

Earnings

Wage rates for coin machine repairers ranged from $6.50 to $13 an hour in 1982. Apprentices start at 50 percent of the rate paid experienced mechanics and receive periodic increases.

Most coin machine repairers work 8 hours a day, 5 days a week, and receive premium pay for overtime. Some union contracts stipulate higher pay for nightwork and for emergency repair jobs on weekends and holidays.

Many coin machine mechanics are members of the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America.

Related Occupations

Other workers who repair equipment with electrical and mechanical components include bowling-pin-machine mechanics, electrical-appliance servicers, laundry machine mechanics, maintenance mechanics, business machine repairers, and sewing machine mechanics.

Sources of Additional Information

Further information on job opportunities can be obtained from local coin machine firms and local offices of the State employment or apprenticehsip service. For general information and a list of schools offering courses in vending machine mechanics, write to:

National Automatic Merchandising Association, 7 S. Dearborn St., Chicago, Ill. 60603.

Industrial Machinery Repairers

(D.O.T. 620, 626, 627, 628, 629, 630, and 709. The D.O.T. index which begins on page 364 lists the nine digit codes included under this occupation.)

Nature of the Work

When a machine breaks down in a plant or factory, not only is the machine idle, but raw materials and human resources are wasted. It is the industrial machinery repairer's job to prevent these costly breakdowns and to make repairs as quickly as possible.

Industrial machinery repairers—often called maintenance mechanics—spend much time doing preventive maintenance. This includes keeping machines well oiled and greased, and periodically cleaning parts. Repairers regularly inspect machinery and check performance. They use tools such as micrometers, calipers, and depth gauges to measure and align all parts. For example, forearms on industrial robots in motor vehicle manufacturing plants need frequent adjustment, and gears, bearings, and other mechanical parts have to be aligned and lubricated. By keeping complete and up-to-date records, mechanics try to anticipate trouble and service the machinery before the factory's production is interrupted.

When repairs become necessary, the maintenance mechanic must first locate the specific cause of the problem. This requires knowledge reinforced by experience. For example, after hearing a vibration from a machine, the mechanic must decide whether it is due to worn belts, weak motor bearings, or any number of other possibilities.

After diagnosing the problem, the maintenance mechanic disassembles the equipment and then repairs or replaces the necessary parts. A wide range of tools may be used. For example, repairers may use a screwdriver and wrench to adjust an engine, or a hoist to lift a printing press off the ground. Repairers use catalogs to order replacements for broken or defective parts. When parts are not readily available, or when a machine must be quickly returned to production, repairers may sketch a part that can be fabricated by the plant's machine shop. Repairers often follow blueprints and engineering specifications in maintaining and fixing equipment.

The repairer reassembles and tests each piece of equipment after it has been serviced, for once it is back in operation, the machine is expected to operate satisfactorily.

Some of the industrial machinery repairer's duties may be performed by millwrights. (See the statement on millwrights elsewhere in the *Handbook*.)

Working Conditions

Repairers may work in stooped or cramped positions, to reach the underside of a generator,

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Employment of industrial machinery repairers is heavily concentrated in industrialized areas.

for example. They also may work from the top of a ladder when repairing a large machine. These workers are subject to common shop injuries such as cuts and bruises. In addition to their regular work schedule, industrial machinery repairers may be called to the plant at night or on weekends for emergency repairs.

Employment

Industrial machinery repairers held about 330,000 jobs in 1982, about 37,000 fewer than in 1980. This decline reflects the severe dropoff in economic activity during the 1981-82 recession. Repairers work in every industry in which a great deal of machinery is used. Six of every 10 work in manufacturing industries, primarily in machine shops, printing plants, oil refineries, garment shops, automobile and aircraft companies, and food processing plants.

Because industrial machinery repairers work in a wide variety of plants, they are employed in every section of the country. Employment is concentrated, however, in heavily industrialized areas.

Training, Other Qualifications, and Advancement

Most workers who become industrial machinery repairers start as helpers and pick up the skills of the trade informally and by taking courses offered by machine manufacturers. Some learn the trade through apprenticeship programs sponsored by the United Automobile, Aerospace and Agricultural Implement Workers of America and the International Union of Electronics, Electrical, Technical, Salaried and Machine Workers. This training usually lasts 4 years and consists of on-the-job training and related classroom instruction in subjects such as shop mathematics, shop theory, blueprint reading, welding, and safety. Optional electronics training is offered as a part of the apprenticeship program but is not required. However, a growing number of employers prefer this background.

Graduation from high school is preferred, but not always required, for entry into this occupation. High school courses in mechanical drawing, mathematics, blueprint reading, physics, and electronics are useful for those interested in entering this trade.

Mechanical aptitude and manual dexterity are important qualifications for workers in this trade. Good physical condition and agility are also necessary because repairers sometimes have to lift heavy objects or climb to reach equipment located high above the floor.

Examinations may be administered periodically by employers to determine the repairer's ability to maintain more advanced machinery. Some repairers are promoted to master mechanics or become machinists or tool-and-die makers.

Job Outlook

Employment of industrial machinery repairers is expected to increase about as fast as the average for all occupations through the mid-1990's as manufacturers invest in more industrial machinery. Also, as machinery becomes more complex, repair work and preventive maintenance will become more time consuming. Besides jobs that will be created from increased demand for industrial machinery repairers, many openings will result each year from the need to replace repairers who transfer to other occupations, retire, or die.

Industrial machinery repairers are not usually affected by seasonal changes in production. During slack periods, when some plant workers are laid off, repairers often are retained to do major overhaul jobs. Although these workers may face layoff or a reduced workweek when economic conditions are particularly severe, they generally are less affected than other workers because machines have to be maintained regardless of the level of production.

Earnings

According to the available data, industrial machinery repairers had average hourly wages of $11.28 in 1982, about one-half higher than the average for all nonsupervisory workers in private industry, except farming. Average hourly earnings of industrial machinery repairers in 22 areas that represent various regions of the country are shown in table 1.

Table 1. Average hourly earnings of industrial machinery repairers selected areas, 1982

Area	Hourly rate
Detroit	$ 12.86
Baltimore	12.48
Houston	11.97
Chicago	11.32
Los Angeles	11.10
Minneapolis–St. Paul	10.62
New York	10.47
Atlanta	9.86
Miami	9.80
Boston	9.33
Portland, Maine	7.41

SOURCE: Bureau of Labor Statistics.

Labor unions to which most industrial machinery repairers belong include the United Steelworkers of America; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the International Association of Machinists and Aerospace Workers; and the International Union of Electronic, Electrical, Technical, Salaried and Machine Workers.

Related Occupations

Other occupations which involve repairing machinery include aircraft mechanics, automobile mechanics, bowling-pin-machine mechanics,

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machinists, millwrights, tool-and-die makers, and vending machine mechanics.

Sources of Additional Information

Information about employment and apprenticeship opportunities in this field may be available from local offices of the State employment service or from:

International Union of Electronic, Electrical, Technical, Salaried and Machine Workers, 1126 16th St. NW., Washington, D.C. 20036.

Millwrights

(D.O.T. 638.261-010, -014, -018, .281-018, and -022)

Nature of the Work

With the coming of the Industrial Revolution, machines and factories replaced many handcrafts. The textile industry in England was one of the first to use machinery to mass produce its goods. The workers who planned and built the textile mills and set up the equipment that was needed were called millwrights. The occupation gradually expanded to other factories, and today the millwright installs and dismantles machinery and heavy equipment used in almost every industry, from food processing to coal mining.

The millwright's responsibilities begin when machinery arrives at the job site. The new equipment must be unpacked and unloaded, inspected for damaged and missing parts, and then moved into position. To lift and move light machinery, millwrights may use rigging and hoisting devices such as pulleys and cables. Moving machinery sometimes requires the assistance of a hydraulic lift-truck operator. In cases where machinery and parts are too heavy for handtools and lift-trucks, millwrights must work with a crane operator, signalling the operator while the crane carries the machinery to its new site.

Because millwrights often choose the devices for moving machinery, they must know the load-bearing properties of ropes, cables, hoists, and cranes. For example, when installing a new oven in a food processing plant, a millwright sets up steel cables and a small hoist to move the oven from the truck on which it arrived to the conveyor that will carry it into the plant. The oven is then lifted, with other hoisting devices and perhaps the aid of a crowbar for leverage, onto a dolly and taken to the foundation for proper positioning.

New machinery sometimes requires a new foundation. Since they either personally prepare or supervise the construction of the foundation, millwrights must know how to read blueprints and work with building materials such as concrete, wood, and steel.

In assembling machinery, millwrights fit bearings, align gears and wheels, attach motors, and connect belts according to the manufacturer's blueprints and drawings. Precision leveling and alignment are important in the assembly process; millwrights must have good mathematical skills so that they can measure angles, material thickness, and small distances with tools such as squares, calipers, and micrometers. In some cases, particularly when lining up conveyor machinery or tracks, a millwright may use laser equipment to "shoot" a straight line over long distances. Millwrights also use hand and power tools, cutting torches, welding machines, and soldering guns. Some millwrights use lathes to grind or turn parts to specifications.

A growing number of millwrights install industrial robots in manufacturing plants. In these factories, millwrights also rearrange machinery, install and/or reroute conveyors and tracks in order to make better use of available space.

A millwright is often called a "jack of all trades" because of the variety of skills the job entails. In addition to installing and dismantling machinery, many millwrights repair and maintain equipment. This includes preventive maintenance, such as oiling and greasing, and fixing or replacing worn parts. (For further information on machinery maintenance occupations, see the statement on industrial machinery repairers elsewhere in the *Handbook*.)

Millwrights employed by contract installation and construction companies do a variety of installation work. Those employed in factories usually install only the particular types of machinery used by their employers.

Working Conditions

Millwrights employed by factories ordinarily work year round. Those employed by construction companies and companies that manufacture and install machinery may experience periods of unemployment; however, they usually are compensated with a higher hourly wage rate. These millwrights may travel long distances every day to and from the job site.

Millwrights are subject to the usual shop hazards such as cuts and bruises. They also face injury from falling objects or machinery that is being moved, and from falls when climbing up walkways and platforms to install equipment. These dangers can be reduced by the use of protective devices such as safety belts and hard hats, however.

Employment

Millwrights held about 91,000 jobs in 1982, about 11,000 fewer than in 1980. This decline reflects the drop in economic activity during the 1981-82 recession, especially in those industry sectors where most millwrights are employed—manufacturing and construction.

Although millwrights work in every State, employment is concentrated in heavily industrialized areas where most manufacturing and heavy construction take place.

Training, Other Qualifications, and Advancement

Most millwrights start as helpers to skilled workers and learn the trade informally on the job. This process can take from 6 to 8 years. Others learn through 4-year formal apprenticeship programs that combine on-the-job training with classroom instruction. Apprenticeship programs include training in dismantling, moving, erecting, and repairing machinery. Apprentices also may work with concrete

Millwrights install and maintain a wide range of plant equipment.

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and receive instruction in related skills such as carpentry, welding, and sheet-metal work. Classroom instruction is given in shop mathematics, blueprint reading, hydraulics, electricity, and safety.

Applicants for apprentice or helper jobs must be at least 17 years old. Most employers prefer applicants with a high school diploma or its equivalent. Courses in science, mathematics, mechanical drawing, and machine shop practice are useful. Because millwrights often take apart complicated machinery, mechanical aptitude is important. Strength and agility also are important, because the work can require a considerable amount of lifting and climbing.

Job Outlook

Employment of millwrights is expected to increase faster than the average for all occupations through the mid-1990's. Some of this projected growth reflects the anticipated rebound in employment to pre-recession levels. Employment will increase as new plants are built, as existing plant layouts are improved, and as increasingly complex machinery is installed and maintained. Besides job openings created by increased demand for millwrights, many openings will arise annually as experienced millwrights retire or transfer to other occupations.

Employment of millwrights is somewhat sensitive to changes in economic conditions. In the construction industry, for example, employment fluctuates with the level of commercial and industrial building activity. When interest rates are high and construction activity falls, jobs are scarce and even experienced millwrights may face layoffs or a shortened workweek. They are also subject to seasonal layoff caused by snow, rain, and other bad weather conditions. Millwrights who work in manufacturing plants, however, usually have more stable employment. They are not subject to seasonal layoffs because they generally work indoors. During poor economic conditions, jobseekers may find fewer opportunities because employers are not installing new equipment. Unlike millwrights in construction, few millwrights in manufacturing are laid off when high interest rates discourage the purchase of new equipment. Existing machinery still needs to be maintained and repaired. Layoffs do occur, however, when plants operate at reduced levels or are closed.

Earnings

Median hourly earnings of most millwrights were $11.50 per hour in 1982; the middle 50 percent earned between $9.50 and $13.75 per hour. The lowest 10 percent earned less than $7.00, and the top 10 percent earned more than $16.00. In contrast, the average hourly wage for all nonsupervisory workers in private industry, except farm was $7.67. Earnings for millwrights in 10 areas that represent various regions of the country appear in table 1.

Table 1. Average hourly earnings of millwrights in selected areas, 1982

Area	Hourly rate
Cleveland	$13.33
Indianapolis	13.18
Sacramento	12.78
Baltimore	12.70
Louisville	12.47
Philadelphia	11.99
Houston	11.97
Chicago	11.32
New York	10.47
Boston	9.94
Atlanta	9.86

SOURCE: Bureau of Labor Statistics.

Many millwrights belong to labor unions. Among these are: International Association of Machinists and Aerospace Workers; United Brotherhood of Carpenters and Joiners of America; United Steelworkers of America; International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; United Paperworkers International Union; International Union of Electrical, Radio and Machine Workers; and International Brotherhood of Firemen and Oilers.

Related Occupations

To set up machinery for use in a plant, millwrights must know how to use hoisting devices, and how to assemble, disassemble, and in some cases repair machinery. Other workers with similar job duties are industrial machinery repairers, ironworkers, and machine assemblers.

Sources of Additional Information

For further information on apprenticeship programs, write to the Apprenticeship Council of your State's labor department, local offices of your State employment service, local firms that employ millwrights, or the Associated General Contractors of America, 1957 E St. NW., Washington, D.C. 20006.

Musical Instrument Repairers

(D.O.T. 730.281-014, -026, -038, -050, -054, .361-010, -014, .381-010, -026, -034, -038, -042, -058, .681-010, .684-022, -026, and -094)

Nature of the Work

Whether they are used to perform the classics or contemporary rock, musical instruments are sources of entertainment and recreation for millions of people. Maintaining these instruments so they perform properly is the job of piano and instrument repairers. There are many different kinds of musical instrument repairers. Five of the most common are piano tuners, piano technicians, pipe-organ tuners and repairers, and brass and wind instrument repairers.

Piano tuners adjust piano strings so that they will be in proper pitch. When a piano key is struck, a felt-covered wooden hammer strikes one or more strings, causing them to vibrate. The number of times a string vibrates in a second is called its pitch. For the piano to sound right, all its strings must be set at their proper pitch.

Tuners begin by adjusting the pitch of the "A" or "C" string. Striking the key, the tuner compares the string's pitch to that of a tuning fork. Using a tuning hammer (also called a tuning lever or wrench), the tuner turns a steel pin to tighten or loosen the string until its pitch matches that of the tuning fork. The pitch of all the other strings is set in relation to the "A" or "C" string. The standard 88-key piano has about 230 strings and can be tuned in about an hour and a half.

The sound of the piano also can be affected by problems in and of the thousands of wooden, steel, iron, ivory, and felt parts in its works. Piano technicians locate and correct these problems. Technicians also tune pianos.

To get an idea of what is wrong with the piano, technicians talk with the customer. They also may play the instrument or partially dismantle it to inspect the parts. When technicians discover the problem, they make repairs or adjustments. They may realign hammers that do not strike the strings properly. They may replace worn felt or broken strings or rebuild or replace the wooden sounding board that amplifies the string's vibrations. Sometimes technicians completely rebuild pianos. To dismantle and repair pianos, technicians use common handtools as well as special ones, such as regulating, repinning, and restringing tools.

Although organs and pianos may look somewhat alike, they work differently, and few tuners and repairers work on both instruments. Moreover, people who service organs specialize in either pipe or electronic organs. Electronic organs are not included in this statement.

Pipe-organ repairers tune, repair, and install organs that make music by forcing air through one of two kinds of pipes—flue pipes or reed pipes. The flue pipe sounds when a current of air strikes a metal lip in the side of the pipe. The reed pipe sounds when a current of air vibrates a brass reed inside the pipe.

To tune an organ, repairers first match the pitch of the "A" pipes with that of a tuning fork. The pitch of other pipes is set by comparing it with that of the "A" pipes. To tune a flue pipe, the technician moves the metal slide that increases or decreases the pipe's "speaking length." To tune a reed pipe, the technician alters the length of the brass reed inside the pipe. A day or more may be needed to finish one of these jobs, because most organs have hundreds of pipes.

Like piano technicians, pipe-organ repairers must locate and correct problems in the organ's components that affect its sound. This may involve replacing worn parts of the pipes, the console, or other components. Repairers also do maintenance work, such as cleaning the pipes, on a regular schedule.

Occasionally, pipe-organ repairers assemble organs onsite in churches and auditoriums. They follow the designer's blueprints and use a variety of hand and power tools to install and

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The ability to play the instrument is helpful.

connect the air chest, blowers, air ducts, pipes, and other components. Technicians may work in teams or be assisted by helpers. A job may take several weeks or even months, depending on the size of the organ.

Violin repairers adjust and repair bowed instruments, such as violins, violas, and cellos, using a variety of handtools. They find defects by close inspection and by playing the instrument. They remove cracked or broken sections with heated knives so that the delicate instrument is not damaged. The defective parts are replaced, and the instrument is restrung. In order to restore an old or severely damaged instrument to its original condition, the repairer must fill in scratches with putty, sand the rough spots, and apply paint or varnish.

Brass and wind instruments include trumpets, cornets, tubas, clarinets, flutes, and saxophones. Brass and wind instrument repairers clean, adjust, and repair these instruments. They may move mechanical parts or play scales to find any defects in the instrument. They may unscrew and remove rod pins, keys, and pistons, and may remove soldered parts by using gas torches. These repairers remove dents in metal instruments by using mallets or burnishing tools. They fill cracks in wood instruments by inserting pinning wire into the cracks and covering them with filler.

Working Conditions

The work of musical instrument repairers is relatively safe, although they may suffer small cuts and bruises when making repairs. Work is performed in shops, music stores homes, and public buildings, such as churches and schools, where working conditions usually are good.

Employment

Musical instrument repairers held about 14,000 jobs in 1982. Most worked on pianos. About three-fourths worked in music stores or for musical instrument manufacturers. Most of the rest worked in repair shops; about half were self-employed. Most musical instrument repairers work in large metropolitan areas.

Training, Other Qualifications, and Advancement

Musical instrument repairers generally learn their trade on the job. Some music stores, large repair shops, and self-employed technicians hire inexperienced people as trainees. Trainees do general cleanup work, help move and install instruments, and do other routine tasks. Trainees tune and repair instruments under the supervision of experienced workers. Usually 2 to 5 years of training and practice are needed to become a competent musical instrument repairer.

For those people who are interested in piano tuning and repair, a small number of technical schools and colleges offer courses in piano technology that last 6 months to 2 years. Home study (correspondence school) courses in piano technology also are available. These courses emphasize practice tuning and piano repair. Graduates of these courses generally are encouraged to refine their skills by working for a time with an experienced tuner or technician. Employers generally prefer to hire workers with some knowledge of the trade.

For those who are interested in other types of instrument repair, a few music repair schools offer a 1 or 2-year course in complete overhauling and refinishing of brass, woodwind and string instruments. Beginners may also learn these skills as apprentices under the supervision of experienced technicians.

Employers prefer high school graduates for beginning jobs in musical instrument repair. Music courses help develop the student's ear for tonal quality. Courses in woodworking also may be useful because many of the moving parts of some instruments are made of wood.

People interested in a career in these fields should have good hearing, mechanical aptitude, stamina, and manual dexterity. Because work frequently is done in the customer's home—especially piano repair—a neat appearance and a pleasant, cooperative manner also are important. Ability to play the instrument helps but is not essential.

Musical instrument repairers keep up with new developments in their fields by studying trade magazines and manufacturers' service manuals. The Piano Technicians Guild helps its members improve their skills through training programs conducted at local chapter meetings and at regional and national seminars. Guild members also can take a series of tests to earn the title Registered Piano Tuner-Technician. The title is an acknowledgment of the technician's skills.

Repairers and technicians who work for large dealers or repair shops can advance to supervisory positions. Some people in this field, however, go into business for themselves. Opening a repair business is fairly easy because only a small investment in tools is required. Basic music instrument repair tools cost only a few hundred dollars. However, the musical instrument repair business is very competitive. People without adequate training often fail to attract enough customers to stay in business. Self-employed tuners and repairers operate out of their own homes and use either a car or a small truck for service calls. They also may work at another job until their clientele is large enough to support a repair business.

Job Outlook

Employment of musical instrument repairers is expected to increase about as fast as the average for all occupations through the mid-1990's. Besides growth in employment, job openings will arise from the need to replace experienced workers who transfer to other occupations, retire, or leave the occupation for other reasons. However, since this is a very small occupation, the total number of job openings will be small.

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Millions of musical instruments already are in use and the number will increase as the population grows and as people have more leisure time. The large number of instruments in use will assure a demand for repair work. However, opportunities for untrained workers in these occupations are few. Most music store owners and self-employed tuners and repairers are reluctant to train persons who do not have at least a basic understanding of instrument repair. Training such people requires time that could be more profitably spent doing tuning or repair work. Individuals with some familiarity of the trade may find it easier to get a trainee job.

Because musical instrument tuning and repair are a luxury for most consumers, these occupations are sensitive to the downturns in the economy. During poor economic conditions, tuners and repairers may lose income because their customers put off tuning and repairing instruments. People wishing to enter the trade usually find music store owners and self-employed repairers and technicians especially reluctant to hire trainees when business is slow.

Earnings

Median annual earnings of most musical instrument repairers were $14,500 in 1982; the middle 50 percent earned between $10,400 and $15,600 annually. Ten percent earned less than $7,800, and 10 percent earned more than $18,200.

Self-employed tuners and repairers earned from $15,000 to $25,000 a year in 1982, according to limited available information. Earnings of the self-employed depend on the size of the community, their ability to attract and keep customers, their operating expenses, and the amount of competition from other tuners and repairers.

Related Occupations

Mechanical aptitude and manual dexterity are qualities that are needed in musical instrument repair. Other workers who possess these traits are radio and television service repairers, coin machine repairers, pinsetter mechanics, household appliance repairers, instrument repairers, and office machine repairers.

Sources of Additional Information

Details about job opportunities may be available from local music instrument dealers and repair shops.

For general information about piano technicians and a list of schools offering courses in piano technology, write to:

Piano Technicians Guild, 113 Dexter Ave. N., Seattle, Wash. 98109.

For general information on musical instrument repair, write to:

Allied Music Corporation, P.O. Box 288, Elkhorn, Wisc. 53121.

National Association of Professional Band Instrument Repair Technicians (NAPBIRT), P.O. Box 51, Normal, Ill. 61761.

Office Machine Repairers

(D.O.T. 633, 706.381-010 and -030)

Nature of the Work

Office or business machine repairers maintain and repair the machines that are used to process paperwork in business and government. These machines include typewriters, adding and calculating machines, cash registers, dictating machines, postage meters, and duplicating and copying equipment. (Computer service technicians, who work on data processing equipment, are discussed in a separate statement elsewhere in the *Handbook*.)

Office machine repairers (often called field engineers, customer engineers, or service technicians) make regular visits for preventive maintenance to the offices and stores of customers in their assigned area. The frequency of these service calls depends upon the type of equipment being serviced. For example, an electric typewriter may require preventive maintenance only three or four times a year, while a complex copier probably may require more frequent attention. During these calls, the engineer inspects the machine for unusual wear and replaces any worn or broken parts. Then the machine is cleaned, oiled, and adjusted to ensure peak operating efficiency and to prevent future breakdowns. The engineer also may advise machine operators how to use the equipment more efficiently and how to spot a problem in its early stages.

Despite frequent maintenance, business machines do occasionally malfunction. When notified of a breakdown, a field engineer promptly goes to the customer's place of business, examines the machine, and determines the cause of the malfuction. Once the problem has been isolated, repairs can be made. Minor repairs generally can be made on the spot since most repairers carry a complete line of repair parts; more serious repairs, however, may require that a component or the entire machine be taken to the repair shop.

Office machine repairers generally specialize in one type of machine. Those employed by manufacturing companies or dealers usually are familiar only with the brand produced or sold by their employer. Repairers who work for small independent repair shops must be able to work on equipment from several different manufacturers.

Repairers use common handtools, such as screwdrivers, pliers, and wrenches, as well as other tools especially designed to fit certain kinds of business machines. In addition, they use meters, oscilloscopes, and other types of test equipment to check for malfunctions in electronic circuits.

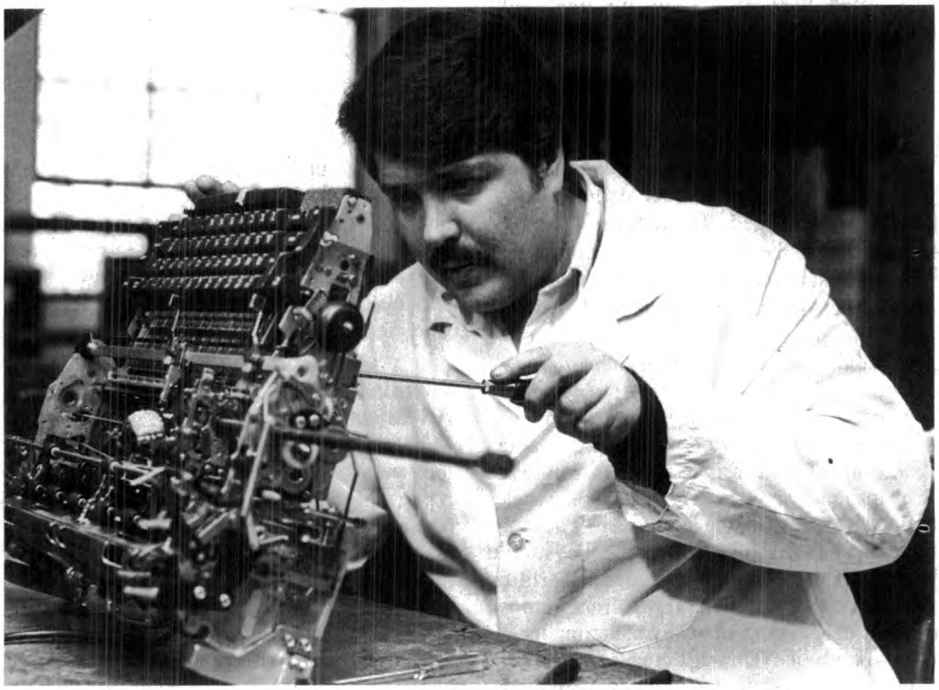
Working Conditions

Servicing office machines is cleaner and less strenuous than the work in most other mechanical trades. Repairers generally wear business clothes and do most of their work in the customer's office.

Workers travel a great deal because they usually visit a number of customers each workday. They generally use their own cars and are reimbursed on a mileage basis. Major manufacturers usually provide vehicles for their repairers. Injuries are uncommon.

Employment

Office machine repairers held about 56,000 jobs in 1982. Most worked on typewriters, calculators, copiers, and duplicators. Others serviced proof machines in banks, accounting--bookkeeping machines, cash registers, and



Much of the office machine repairer's time is spent doing preventive maintenance.

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postage and mailing equipment. A small number repaired dictating machines.

About 3 out of 4 repairers work for firms that sell and service business machines. The remainder work for equipment manufacturers, independent repair shops, and for organizations large enough to employ their own staff of full-time repairers.

Office machine repairers work throughout the country. Even relatively small communities usually have at least one or two repair shops. Most repairers, however, work in large cities.

Training, Other Qualifications, and Advancement

The amount of formal education required for entry jobs for office machine repairers varies. Some employers hire applicants with a high school education, while many others require at least 1 year of technical training in basic electricity or electronics. Employers agree that electronics training received in the Armed Forces is valuable.

A large proportion of job openings for office machine repairers are filled by experienced workers who transfer from other occupations, most probably from a related job where they serviced mechanical and electronic equipment.

Applicants for entry jobs may have to pass tests that measure mechanical aptitude, knowledge of electricity or electronics, manual dexterity, and general intelligence. Good eyesight, including color vision, is needed to inspect and work on small, delicate parts. Persons considering this type of work should have good hearing to detect malfunctions which may be revealed by sound.

Employers seek applicants who have a pleasant, cooperative manner. Because most machine servicing is done in customers' offices, the ability to work without interrupting the office routine is very important. A neat appearance and the ability to communicate effectively are essential.

Office machine repairers must be trustworthy because they sometimes are exposed to large sums of money and other valuables in banks and offices. Some employers require that they be bonded. They must work without direct supervision and must be able to set up maintenance schedules for their customers' equipment and arrange their own schedules so that they can meet service deadlines and also handle emergency repairs.

Trainees who work in a manufacturer's branch office or for a franchised dealer usually attend a school sponsored by the manufacturer. Training programs at company schools usually last several weeks to several months, depending on the type of machine the repairer will service. Trainees then receive from 1 to 3 years of practical experience and on-the-job training before they become fully qualified repairers. These workers generally learn to service only the company's line of equipment.

Independent repair shops usually offer less formal training, consisting of a self-study course plus on-the-job instruction under the supervision of an experienced repairer. Because small repair shops usually do not specialize in the more sophisticated types of equipment, their repairers are expected to be familiar with the more common machines produced by many manufacturers. For example, office machine repairers in small shops should be able to repair several different makes of typewriters, adding machines, and calculators.

Office machine repairers frequently attend training seminars sponsored by equipment manufacturers for special instruction in new business machines. They also are encouraged to broaden their technical knowledge during nonworking hours. Many companies pay the repairer's tuition for work-related courses in college and technical schools.

Because of their familiarity with equipment, office machine repairers are particularly well qualified to advance to sales jobs as manufacturers' sales workers. Repairers who show management abilities also may become service managers or supervisors. Experienced repairers sometimes open their own repair shops; those who work in manufacturers' branch offices may become independent dealers or buy sales franchises from the company.

Job Outlook

Employment of office machine repairers is expected to grow much faster than the average for all occupations through the 1990's, as business and government buy more machines to handle a growing volume of paperwork. Most job openings will arise from the need to replace experienced repairers who transfer to other occupations—such as computer service technician or manufacturer's sales worker—retire, or stop working for other reasons.

Employment opportunities for qualified beginners are expected to be excellent. In recent years, many technical changes have occurred in business machines. Electronic calculating machines have replaced mechanical models, for example, and electronic cash registers are replacing mechanical registers. Because of the greater use of such equipment, opportunities will be particularly favorable for repairers who have training in electronics.

Office machine repairers have steadier employment than many other skilled workers. Office machines must be maintained even when business slackens, since records must be kept, correspondence processed, and statistical reports prepared.

Earnings

Median weekly earnings of full-time office machine repairers were about $370 in 1982; the middle 50 percent earned between $280 and $400. Ten percent earned less than $200, and 10 percent earned more than $550.

In 1982, trainees started at about $180 to $290 a week, according to the limited information available. Even during training, salaries often are increased as workers advance to more complicated assignments. People who have previous electronics training in the Armed Forces or civilian technical schools generally receive somewhat higher beginning wages than high school graduates.

Experienced repairers earned from $300 to $380 a week, while highly skilled specialists earned from $400 to $550. Repairers who can work on more than one type of equipment may earn substantially more than those who are familiar with only one type of machine.

In many areas, earnings for office machine repairers are comparable to those of computer service technicians with similar skills, responsibilities, and experience. (See the statement on computer sevice technicians, a closely related occupation, elsewhere in the *Handbook*.)

Related Occupations

Other workers who service complicated electronic and mechanical equipment include appliance repairers, automotive electricians, computer service technicians, electronic organ technicians, instrument repairers, radio repairers, radar mechanics, and television service technicians.

Sources of Additional Information

For more details about job opportunities, contact local firms that manufacture, sell and service business machines and the local office of the State employment service. The State department of education in your State capital can furnish information about approved technical institutes, junior colleges, and other institutions offering postsecondary training in basic electronics. For general information about the work of office machine repairers, contact:

Computer and Business Equipment Manufacturer's Association, 311 First St. NW., Washington, D.C. 20001.

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OTHER MECHANICS AND REPAIRERS

Title	Definition	Employment 1982	Projected growth 1982–95
Automobile repair-service estimators	Inspect and test automobiles and trucks to determine the need and cost of repairs.	11,000	Faster than average
Bicycle repairers	Repair and service bicycles, using hand tools.	14,000	About as fast as average
Car repairers, railroad	Repair and rebuild railway freight cars, tank cars, or locomotives, following Federal and company regulations and specifications, and using hand tools, welding equipment, powertools, and measuring instruments.	24,000	Expected to decline
Electric motor repairers	Repair electric motors, generators and accessory equipment, such as starting devices and switches, using hand tools, power tools, precision gages, and electrical test instruments. Disassemble motors and test armatures and other parts for wear. Rewind armatures, stators, and field coils. May be designated according to parts repaired as Stator Repairers; Coil Winders, etc.	19,000	Faster than average
Instrument repairers	Install, repair, maintain, and adjust indicating, recording, telemetering, and controlling instruments used to measure and control variables such as pressure, flow, temperature, motion, force, and chemical composition.	41,000	About as fast as average
Locksmiths	Repair and open locks, make keys, and change lock combinations, using hand tools and special equipment.	13,000	Faster than average
Maintenance repairers, general utility	Perform work involving two or more maintenance skills to keep the machines, and mechanical equipment and structures of establishments in repair. This occupation is generally found in small establishment repairing, carpentry and electrical work, as well as planning and laying out of work relating to repairs; repairing electrical and mechanical equipment; installing, alining and balancing new equipment; and repairing buildings, floors, or stairs.	694,000	About as fast as average
Managers, automobile service departments	Coordinate and supervise activities of workers in one or more service departments of automobile accessories sales-service establishments; assist sales personnel in adjusting customers' service complaints; hire, transfer, and discharge workers; supervise activities of workers engaged in testing new equipment and recommend purchase, or rejection of equipment; determine work standards and evaluate workers' performance.	54,000	Faster than average
Oilers	Oil and grease moving parts of friction surfaces of mechanical equipment, such as shaft and moving bearings, sprockets, drive chains, gears, and pulleys, according to specified procedures and oral instructions.	36,000	About as fast as average
Watchmakers	Repair, clean, and adjust mechanisms of instruments such as watches, time clocks and timing switches, using hand tools and measuring instruments.	14,000	Expected to decline

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Construction and Extractive Occupations

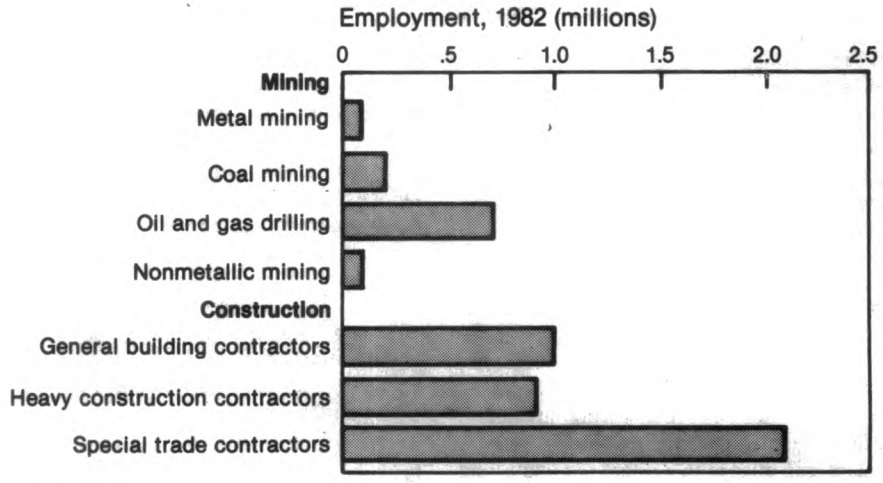
Construction and extractive workers make up two of the most important groups of occupations in the Nation's labor force. Construction workers build the houses that shelter the population and construct the factories in which the Nation's goods are produced. Extractive workers mine the fuels and raw materials needed in all industries.

Construction, mining, and oil and gas drilling are complex operations that require workers with many kinds of skills. Construction and extractive workers accomplish their tasks using tools, machinery, and materials that frequently are peculiar to their occupation. Brickmasons work with mortar, trowels, and brick. Blasters shatter ores and stone with explosives. Although construction and extractive workers use laborsaving machinery and tools, the work in most of these occupations is physically demanding.

Workers in the construction and extractive occupations usually acquire their skills through on-the-job training. Although many employers prefer to hire high school graduates, physical strength, stamina, and mechanical aptitude often are as important as an applicant's level of education. New workers learn by doing the job under the supervision of experienced workers. For some occupations, new workers also receive classroom instruction in related topics. Electricians, for example, learn electrical theory, mathematics, and blueprint reading, and coal miners take safety classes. The type and length of training vary among the occupations. Union-management contracts frequently set the rules governing opportunities for training and entry into the construction and extractive occupations. Many construction workers, for example, learn their trades through apprenticeships administered by union-management committees.

The occupational statements in this chapter describe in detail the work, training, and job outlook for 15 construction occupations.

Oil and gas drilling and special trade contractors account for more than half of all workers in mining and construction.



SOURCE: Bureau of Labor Statistics

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Construction Occupations

Construction craft workers represent the largest group of skilled workers in the Nation's labor force. The construction trades offer especially good opportunities for young people who are not planning to go to college, but who are willing to spend several years learning a skilled occupation. Construction workers can find job opportunities in all parts of the country. Their hourly wage rates generally are much higher than those of most other manual workers. Construction trade workers with business ability have greater opportunities to open their own businesses than workers in most other skilled occupations.

What are the Construction Trades?

Workers in the construction trades build, repair, and modernize homes and all kinds of buildings. They also work on a variety of other projects including airports, mass transportation systems, and recreation facilities.

Construction workers may be divided into three categories: Structural, finishing, and mechanical. *Structrual workers* include: Bricklayers, carpenters, cement masons, ironworkers, construction machinery operators, stonemasons, and boilermakers; *finishing workers* include: Floor covering installers, glaziers, insulation workers, marble setters, painters, paperhangers, plasterers, roofers, and terrazzo workers; and *mechanical workers* include: Electricians, pipefitters, plumbers, sheet-metal workers, and millwrights.

Most construction trades are described individually later in this section. Boilermakers and millwrights are described elsewhere in the *Handbook*.

Working Conditions

Construction work frequently requires prolonged standing, bending, and working in cramped quarters. Exposure to weather is common since much of the work is done outdoors or in partially enclosed structures. Many people prefer construction work because it permits them to be outdoors.

Construction workers may need to work with sharp tools, amidst a clutter of materials. In addition, they often work on scaffolding. As a result, they are more prone to injuries than workers in other jobs. Indeed, the construction industry has the highest injury and illness rate of all industries. However, employers increasingly are emphasizing safe working conditions and stressing safe work habits—practices that reduce the risk of injuries. "Hard hats," steel-toed shoes, safety belts, and nets are some of the devices that help reduce risk.

Employment

Construction craft workers held 3.1 million jobs in 1982, about 250,000 fewer than in 1980. This decline reflects the severe dropoff in construction activity during the 1981-82 recession. Most construction workers are employed by contractors in the construction industry. The vast majority of construction contractors employ fewer than 10 people. A few large contractors, however, employ thousands. Large numbers of construction trade workers are employed in other industries, such as mining and manufacturing, mainly to do maintenance and repair work. Chemical manufacturers, for example, need plumbers and pipefitters to maintain the complex pipe networks in their processing plants. Government agencies employ construction trade workers to maintain highways, buildings, and sanitation systems.

About 1 out of 4 construction craft workers is self-employed and contracts with homeowners and businesses for small jobs. Self-employment is most common in paperhanging, painting, and floor covering work, but it also is found in other trades.

Employment in the construction trades is distributed geographically in much the same way as the Nation's population. Thus, construction workers are concentrated in industrialized and highly populated areas.

Training, Other Qualifications, and Advancement

Most training authorities recommend formal apprenticeship training as the best way to acquire the all-round skills of the construction trades. Apprenticeship is a prescribed period of on-the-job training, supplemented by related classroom instruction that is designed to familiarize apprentices with the materials, tools, and principles of their trade. Formal apprenticeship agreements are registered with a State apprenticeship agency or the U.S. Department of Labor's Bureau of Apprenticeship and Training.

Apprentices generally must be at least 18 years old and in good physical condition. A high school or vocational school education or its equivalent, including courses in mathematics and mechanical drawing, is desirable. Courses in construction trades, such as carpentry and electricity, also are recommended. Often, applicants are given tests to determine their aptitudes.

The formal apprenticeship agreement generally calls for 3 to 4 years of on-the-job training and 144 hours or more of related classroom instruction each year. On the job, most instruction is given by a particular craft worker to whom the apprentice is assigned.

Classroom instruction varies among construction trades, but usually includes courses such as history of the trade, characteristics of materials, shop mathematics, and basic construction principles.

In most communities, apprenticeship programs are supervised by joint apprenticeship committees composed of local employers and local union representatives. The committee determines the need for apprentices in the community and establishes minimum standards of education, experience, and training. Whenever an employer cannot provide all-round instruction or relatively continuous employment, the committee transfers the apprentice to another employer. Where specialization by contractors is extensive—for instance, in electrical work—customarily the committee rotates apprentices among several contractors at intervals of about 6 months.

In areas where these committees have not been established, the apprenticeship agreement is solely between the apprentice and the employer or employer group. Many people have received valuable training under these programs, but they have some disadvantages. No committee is available to supervise the training offered and settle differences over the terms and conditions of training. What the apprentice learns depends largely on the employer's business prospects and policies. If the employer lacks continuous work or does only a restricted type of work, the apprentice may find it difficult to develop all-round skills.

Although apprenticeship provides the most thorough training, many people acquire construction skills informally by working as laborers and helpers and observing experienced craft workers. Some acquire skills by attending vocational or trade schools or by taking correspondence school courses.

In many localities, craft workers—most commonly electricians and plumbers—are required to have a license. To qualify for these licenses, they must pass an examination to demonstrate a broad knowledge of the job and of State and local regulations.

Since construction requires a team effort, the ability to work well with supervisors, peers, and subordinates is vital. Manual dexterity is necessary to work quickly and accurately with trowels, hammers, chisels, saws, drills, and other tools and machinery. The ability to solve mechanical and structural problems is important for many highly skilled construction trades. With guidelines from an architect, for example, a plumber might have to plan the layout of a plumbing system for a kitchen or bathroom to make the best use of limited materials and space. Precision, an eye for detail, the ability to picture objects from blueprints, and color discrimination also are vital in many construction trades.

Construction craft workers may advance in a number of ways. Many become supervisors. In most localities, small jobs are run by "working supervisors" who work along with members of

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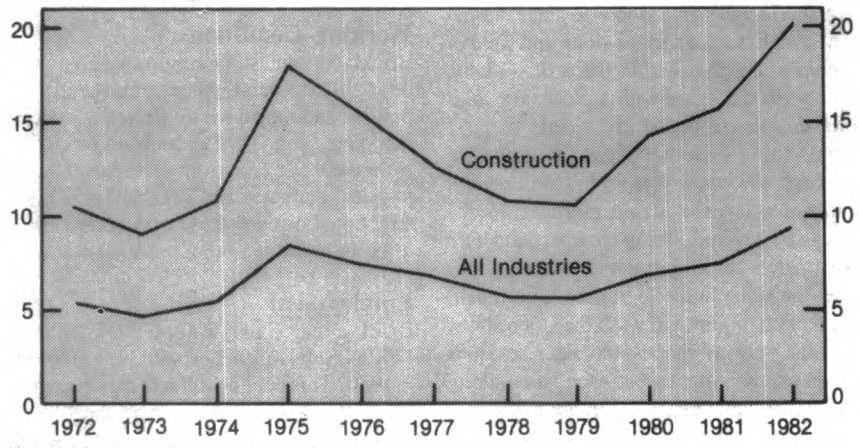
The unemployment rate in construction generally is about twice that in all industries combined.



[1]Unemployment rates for wage and salary workers

SOURCE: Bureau of Labor Statistics

their crews. On larger jobs, the supervisors do only supervisory work. Craft workers also can become estimators for contractors. In these jobs, they estimate material requirements and labor costs to enable the contractor to bid on a particular project. Some craft workers advance to jobs as superintendents on large projects. Others become instructors in trade and vocational schools or sales representatives for building supply companies. A large number of craft workers have become contractors in the home-building field.

Starting a small contract construction business is easier than starting a small business in many other industries. Only a moderate financial investment usually is needed to conduct a substantial business from one's home. However, the field is very competitive, and the rate of business failure is high among small contractors.

Job Outlook

Employment in the construction trades is expected to increase faster than the average for all occupations through the mid-1990's. Some of this growth reflects a rebounding of employment to prerecession levels. Despite rapid growth, most job openings will result each year from the need to replace experienced workers who transfer to other jobs, retire, or leave the labor force for other reasons. Increases in population and the number of households are expected to create pressure for new housing. Migration to the South and West may create pressure in those regions for housing and also for hospitals, schools, recreation facilities, and other structures. Among other factors that will stimulate construction activity are higher levels of personal income and a rise in spending for new industrial plants and equipment. Additional money will be spent to build and renovate mass transit systems and to develop and construct powerplants. Also, the demand will grow for alteration and modernization of existing structures, as well as for maintenance and repair on highway systems, dams, bridges, and similar projects.

The increase in employment is not expected to be as great as the expansion in construction activity. Continued technological developments in construction methods, tools and equipment, and materials will raise output per worker. One important development is the growing use of prefabricated units at the job site. For example, preassembled walls and modules can be lifted into place in one operation.

The rates of employment growth will differ among the various construction trades. Growth is expected to be relatively fast for construction machinery operators and cement masons, and relatively slow for painters and paperhangers. Since construction is sensitive to changes in the Nation's economy, employment may fluctuate from year to year. Construction trade workers can experience periods of unemployment during downturns in construction activity.

Earnings

The average hourly union wage rate for all construction trades was about $14.30 in mid-1982, according to limited available information. The hourly wage rate for all nonsupervisory and production workers in private industry, except farming, averaged $7.67. Wage rates for apprentices and other trainees usually start at 50 percent of the rate paid to experienced workers and increase at 6-month to 1-year intervals until the full rates are achieved upon the completion of training. The accompanying table shows union hourly averages for selected construction trades in 1982.

Table 1. Average hourly union wage rates for selected construction occupations, 1982

Occupation	Hourly rate
Electricians	$16.00
Pipefitters	15.75
Plumbers	15.50
Carpenters	15.00
Structural ironworkers	14.90
Bricklayers	14.80
Insulation workers	14.75
Painters	14.50
Cement finishers	14.25
Roofers, composition	14.15
Plasterers	14.05
Roofers, slate and tile	13.70

SOURCE: Bureau of Labor Statistics.

Wage rates generally were highest in the West and lowest in the South. Except for a few trades, such as electricians, and plumbers and pipefitters, yearly earnings for experienced workers and their apprentices generally are lower than hourly rates would indicate because poor weather and fluctuations in construction activity may adversely affect the number of hours they can work a year.

Traditionally, winter is the slack period for construction activity, particularly in colder regions. Some workers, such as laborers and roofers, may not work for several weeks. However, not only cold but also rain may slow—even stop—work on a construction project. Also, because construction trades depend on one another—particularly on large projects—work delays or strikes in one trade can delay or stop the work of others. The accompanying chart shows that the unemployment rate in the construction industry is about twice that in the Nation as a whole.

A large proportion of construction workers are members of trade unions affiliated with the Building and Construction Trades Department of the AFL-CIO.

Sources of Additional Information

Information about opportunities for apprenticeship or other training can be obtained from local construction firms and employer associations, the local office of the State employment service or State apprenticeship agency, or the local office of the Bureau of Apprenticeship and Training, U.S. Department of Labor. Many apprenticeship programs are supervised by local union-management committees. In these instances, an apprentice applicant may apply directly to the coordinator of the committee.

For additional information on jobs in the construction trades, contact:

Associated General Contractors of America, Inc., 1957 E St. NW., Washington, D.C. 20006.

Building and Construction Trades Department, AFL-CIO, 815 16th St. NW., Washington, D.C. 20006.

National Association of Home Builders, 15th and M Sts. NW., Washington, D.C. 20005.

For the names of labor organizations and trade associations concerned with specific trades, see the discussions of individual building trades that follow.

Bricklayers and Stonemasons

(D.O.T. 861.361-014, .381-010, -014, -018, -022, -026, -030, -038, -042, .684-010, and -014)

Nature of the Work

Bricklayers and stonemasons work in closely related trades, each producing attractive, durable surfaces. Bricklayers build walls, floors,

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partitions, fireplaces, and other structures with brick, cinder or concrete block, and other masonry materials. They also install firebrick linings in industrial furnaces.

Stonemasons build stone walls as well as set stone exteriors and floors. They work with two types of stone—natural cut, such as marble, granite, and limestone; and artificial stone made from cement, marble chips, or other masonry materials. Because stone is expensive, stonemasons work mostly on high-cost buildings, such as churches, hotels, and offices.

In putting up a wall, bricklayers use plumblines and a level to build the corners. They then stretch a line from corner to corner to guide each course or layer of brick. Bricklayers spread a bed of mortar (cement mixture) with a trowel (a flat, metal tool with a handle), place the brick on the mortar bed, and then tap it into place. As blueprints specify, they cut bricks with a hammer and chisel to fit around windows, doors, and other openings. Mortar joints are finished with jointing tools to leave a neat and uniform appearance. Although bricklayers generally use steel supports at window and door openings, they often build brick arches that enhance the beauty of the brickwork.

Bricklayers are assisted by hod carriers, or helpers, who supply bricks and other materials, mix mortar, and set up and move scaffolding. (See the statement on construction laborers that appears elsewhere in the *Handbook*.)

Stonemasons often work from a set of drawings in which each stone has been numbered for identification. Helpers may locate and bring the prenumbered stones to the masons. A derrick operator using a hoist may be needed to lift large pieces into place.

When building a stone wall, masons set the first course of stones into a shallow bed of mortar. They align the stones with plumblines and levels, and adjust them into position with a hard rubber mallet. Masons build the wall by alternating layers of mortar and stone. As the work progresses, they fill the joints between stones and use a pointed metal tool, called a tuck pointer, to smooth the mortar to an attractive finish. To hold large stones in place, stonemasons attach brackets to the stone and weld or bolt them to anchors within the wall. Finally, masons wash the stone with a cleansing solution to remove stains and dry mortar.

When setting stone floors, which often consist of large and heavy pieces of stone, masons first trowel a layer of damp mortar over the surface to be covered. Using crowbars and hard rubber mallets for aligning and leveling, they then set the stone in the mortar bed. To finish, workers fill the joints and wash the stone slabs.

To make various shapes and sizes, masons use a special hammer to cut each stone along the grain. Valuable pieces often are cut with a saw that has a diamond blade.

Setting marble is very much like setting stone. For marble floors, and for walls where the holding strength of mortar alone is sufficient, masons often handset each marble piece into the mortar and leave the face of the marble exposed. For heavy pieces, workers employ a hoist to lift and position the marble. To secure heavy pieces on walls, masons use bolts embedded into the marble slabs which are then attached to brackets in the structure. Once the marble pieces are positioned and secured, workers finish the joints and clean the marble's surface.

In addition to construction, masons do repair work. They repair imperfections and cracks in marble with mortar prepared and finished to match the marble. They also polish and replace marble. Masons use a special saw to cut large pieces of marble.

Refractory repairers or masons are bricklayers who install firebrick and refractory tile in high temperature boilers, furnaces, cupolas, ladles, and soaking pits in industrial establishments. Many work in steel mills, where molten materials flow on refractory beds from furnaces to rolling machines.

A bricklayer applies a brick face or veneer.

Working Conditions

Bricklayers and stonemasons usually work outdoors. They stand, kneel, and bend for long periods and may have to lift heavy materials to complete a job. They also are subject to injuries from tools and falls from scaffolds. Despite the physical demands and general hazards of construction, however, these workers are less likely to be injured than other construction workers.

Employment

Bricklayers and stonemasons held about 124,000 jobs in 1982, about 30,000 fewer than in 1980. This decline reflects the severe dropoff in construction activity during the 1981-82 recession. The vast majority were bricklayers. Workers in these crafts are employed primarily by special trade, building, or general contractors. Some work in industrial plants. A relatively small number of bricklayers work for government agencies or businesses that do their own construction and alteration.

Workers in these trades are employed throughout the country but, like the general population, are concentrated in metropolitan areas. Many masons are qualified to work with a variety of materials and, in areas that are too small to have a demand for full-time stonemasons, bricklayers also will install stone and marble.

About 1 out of 4 bricklayers and stonemasons is self-employed. Many of the self-employed specialize in contracting on small jobs such as patios, walks, and fireplaces.

Training, Other Qualifications, and Advancement

Most bricklayers and some stonemasons pick up their skills informally by working as helpers or hod carriers and by observing and learning from experienced workers. The remainder learn their skills through apprenticeship, which generally provides the most thorough training.

Individuals who learn the trade informally usually start as laborers. They carry materials, move scaffolds, and mix mortar. When the opportunity occurs, they are taught to spread mortar, lay brick, or set stone or marble. As they gain experience, they make the transition to full-fledged craft workers. The learning period generally lasts much longer than an apprenticeship program, however.

Apprenticeships for bricklayers and stonemasons usually are sponsored by local contractors or by local union-management committees. The apprenticeship program requires 3 years of on-the-job training in addition to 144 hours of classroom instruction each year in subjects such as blueprint reading, mathematics, layout work, and sketching. Apprentices learn the general applications of brick, stone, and marble.

Apprentices often start by working with laborers carrying materials, mixing mortar, and building scaffolds. This period generally lasts about a month and familiarizes them with job

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routines and materials. Next, they learn to lay, align, and join brick. Apprentices often learn to work with stone, marble, and concrete. Subsequently, they may be certified to work with more than one masonry material.

Applicants for apprenticeships must be at least 17 years old. Apprentice and helper applicants should be in good physical condition. A high school or vocational school education is preferable, as are courses in mathematics, mechanical drawing, and shop.

Experienced workers can advance to supervisory positions or become estimators. They also can open contracting businesses of their own.

Job Outlook

Employment of bricklayers is expected to grow faster than the average for all occupations through the mid-1990's, as population and business growth create a need for new homes, factories, offices, and other structures. Stimulating this growth will be the increasing use of brick for decorative work on building fronts and in lobbies and foyers. The use of brick is growing, particularly for interior load-bearing walls and sidewalks, and will add to overall employment needs. Employment of bricklayers who specialize in refractory repair may grow more slowly because the primary metal industries, where these workers are concentrated, are not expected to grow as fast as other sectors.

Employment of stonemasons is expected to grow more slowly than the average for all occupations through the mid-1990's. Stone, including marble, has lost some popularity as a building material because it has become much more expensive than materials such as concrete.

Although many jobs will be created by an increase in demand for these workers, most openings will result from the need to replace bricklayers and stonemasons who retire, transfer to other occupations, or leave the trades for other reasons.

Employment of bricklayers and stonemasons, like that of many other construction workers, is sensitive to changes in the economy, particularly changes in the level of construction of homes, factories, and other buildings. Workers in these trades can experience periods of unemployment, particularly when the level of construction activity drops.

Earnings

Median weekly earnings for bricklayers and stonemasons were about $395 in 1982. The middle 50 percent earned between $300 and $455 weekly. The lowest 10 percent earned less than $255, and the highest 10 percent earned more than $550 weekly.

Hourly union wage rates in metropolitan areas were $14.80 for bricklayers, and $14.40 for stonemasons in mid-1982. The average wage for all nonsupervisory and production workers in private industry, except farming, was $7.67 an hour. Limited information indicates that nonunion rates for experienced workers were less than union rates. However, yearly earnings for workers in these trades generally are lower than hourly rates would indicate because poor weather and fluctuations in construction activity adversely affect the annual number of hours they can work.

In each trade, apprentices or helpers start at about 50 percent of the wage rate paid to experienced workers. The rate increases as they gain experience.

A large number of bricklayers and stonemasons are members of the International Union of Bricklayers and Allied Craftsmen.

Related Occupations

Bricklayers and stonemasons combine a thorough knowledge of brick, stone, and marble with manual skill to erect very attractive yet highly durable structures. Other occupations involving similar skills include cement masons, plasterers, terrazzo workers, and tilesetters.

Sources of Additional Information

For details about apprenticeships or other work opportunities in these trades, contact local bricklaying, stonemasonry, or marble setting contractors; a local of the union listed above; a local joint union-management apprenticeship committee; or the nearest office of the State employment service or State apprenticeship agency.

For general information about the work of either bricklayers or stonemasons, contact:

International Union of Bricklayers and Allied Craftsmen, International Masonry Institute Apprenticeship and Training, 815 15th St. NW., Washington, D.C. 20005.

Information about the work of bricklayers also may be obtained from:

Associated General Contractors of America, Inc., 1957 E St. NW., Washington, D.C. 20006.

Brick Institute of America, 1750 Old Meadow Rd., McLean, Va. 22102.

Carpenters

(D.O.T. 860.281-010 through 860.381-054, 860.381-066 through 860.664-010, 860.681-010 through 860.684-014, 863.684-010, 869.361-018,.381-010, and -034)

Nature of the Work

Almost all construction projects employ carpenters, the largest group of building trade workers. Carpenters perform a variety of jobs. In home building, for example, carpenters build the house framework, erect the walls and roof, and install doors, windows, flooring, cabinets, wood paneling and molding, and ceiling tiles. Other construction jobs done by carpenters include building wooden forms and chutes for placing concrete, erecting scaffolding, and building wooden bridges, piers, trestles, tunnel supports, temporary shelters, and cofferdams.

The duties of carpenters vary by type of construction, type of company, skill of the carpenter, and size of the community. A carpenter employed by a special trade contractor, for example, may specialize in laying hardwood floors, while one who is employed by a general building contractor may build wall frames, put in insulation, and install paneling. Although each carpentry task is somewhat different, most tasks involve the following steps.

Working from blueprints, instructions from supervisors, or both, carpenters first do the layout—measuring and marking the building materials. Local building codes often dictate where certain materials can and cannot be used. Carpenters have to know these requirements. Carpenters cut and shape materials, such as wood, plastic, fiberglass, and drywall with hand and power tools, such as chisels, planes, saws, and drills. Carpenters then join the materials with nails, screws, or glue. They check the accuracy of their work with levels, rulers, and framing squares. To complete a task, carpenters may work in teams or be assisted by a helper.

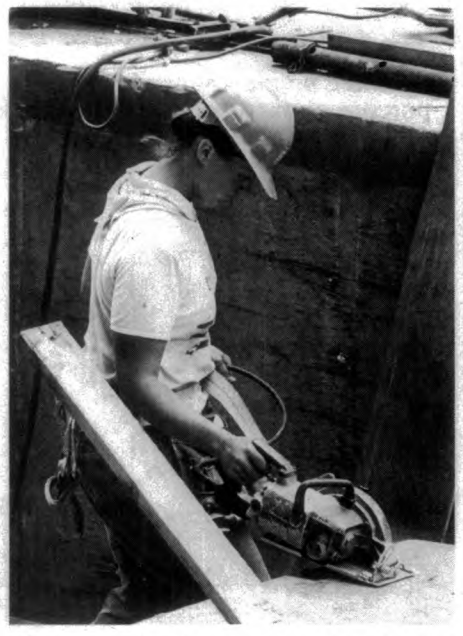
In all assignments, carpenters must work quickly and economically. Taking too much time can delay other steps in the construction. Wasting material can cut the employer's profit.

A small proportion of carpenters are employed outside the construction industry in installation and maintenance work. For example, school districts employ carpenters to replace glass, ceiling tiles, and doors, and to repair desks, cabinets, and other furniture. In factories, carpenters may install machinery. (Millwrights who usually install machinery are discussed elsewhere in the Handbook.)

Working Conditions

As in other building trades, the work is active and sometimes strenuous. Prolonged standing, climbing, and squatting often are necessary. Carpenters risk injury from slips or falls, from contact with sharp or rough materials, and from the use of sharp tools and power equipment. Many carpenters work outdoors.

Some carpenters change employers each time they finish a construction job. Others alternate between working for a contractor and working for themselves on small jobs.



Job opportunities for carpenters depend on the level of construction activity.

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Employment

Carpenters held about 863,000 jobs in 1982, nearly 133,000 fewer than in 1980. This decline reflects the severe dropoff in construction activity during the 1981-82 recession. Most carpenters work for contractors who construct, remodel, or repair buildings and other structures. Some do construction and maintenance for government agencies, utility companies, and manufacturing firms. About 1 out of 3 are self-employed.

Because of their versatility, carpenters are much less concentrated geographically than any other construction occupations.

Training, Other Qualifications, and Advancement

Carpenters learn their trade through on-the-job training, and through formal training programs. Many pick up skills informally by working under the supervision of experienced workers. Some acquire skills through vocational education. Others participate in employer training programs or apprenticeships.

Most training authorities recommend the completion of an apprenticeship as the best way to learn carpentry. Because the number of apprenticeship programs is limited, however, a small portion of carpenters learn their trade through apprenticeship.

Apprenticeship programs are administered by local chapters of the Associated Builders and Contractors, Inc., and local chapters of the Associated General Contractors, as well as by local joint union-management committees of the United Brotherhood of Carpenters and Joiners, and the Associated General Contractors, or the National Association of Home Builders. The programs consist of on-the-job training and related classroom instruction. Apprenticeship applicants generally must be 17 years old and meet local requirements. For example, some locals give tests designed to measure an applicant's aptitude for carpentry. The length of the program, usually about 3 to 4 years, varies with the apprentice's skill.

On the job, apprentices learn elementary structural design and become familiar with common carpentry jobs such as form building, rough framing, and outside and inside finishing. They also learn to use the tools, machines, equipment, and materials of the trade. Apprentices receive classroom instruction in safety, first aid, blueprint reading and freehand sketching, basic mathematics, and different carpentry techniques. Both in the classroom and on the job, they learn the relationship between carpentry and the other building trades.

Informal on-the-job training usually is less thorough than an apprenticeship. The degree of training and supervision often depends on the size of the employing firm. A small contractor who specializes in homebuilding may provide training in only one area—rough framing, for example. In contrast, a large general contractor may provide training in several carpentry skills.

A high school or vocational school education is desirable, including courses in carpentry, shop, mechanical drawing, and general mathematics. Manual dexterity, good physical condition, and a good sense of balance are important. The ability to solve arithmetic problems quickly and accurately and to work closely with others is helpful.

Carpenters may advance to supervisors or general construction supervisors. Carpenters usually have greater opportunities than most other construction workers to become general construction supervisors because they learn more about the entire construction process in their work. Carpenters with sufficient money and managerial skill can become independent contractors.

Job Outlook

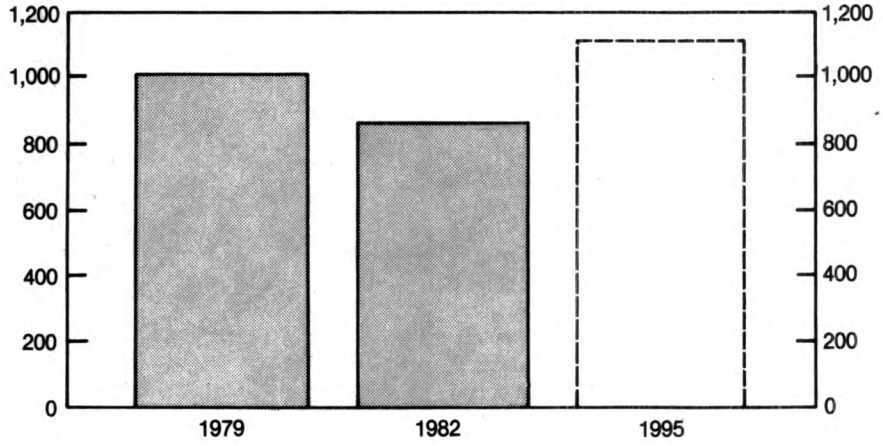
Employment of carpenters is expected to increase as fast as the average for all occupations through the mid-1990's. Some of this growth reflects a rebounding of employment to pre-recession levels. Over the long run, construction activity should increase in response to increasing demand for new housing and industrial plants, and the need to renovate existing industrial plants to make them more productive and energy efficient.

In addition to the jobs resulting from increased demand for carpenters, many openings will occur as carpenters transfer to other occupations or leave the labor force. The total number of job openings for carpenters each year usually is greater than for other craft occupations because the occupation is large and turnover is high. Since there are no strict training requirements for entry, many people with limited skills take jobs as carpenters but eventually leave the occupation because they find they dislike the work or cannot find steady employment.

Although the employment outlook for carpenters is expected to be good over the long run, people entering the occupation should expect to experience periods of unemployment. This results from the short-term nature of many construction projects and the cyclical nature of the construction industry. Building activity depends on many factors—interest rates, availability of mortgage funds, government spending, and business investment—that vary with the state of the economy. During economic downturns, job openings for carpenters are reduced. Carpenters with all-round skills will have better opportunities than those who can only do relatively simple, routine types of carpentry.

Job opportunities for carpenters also vary by geographic area. Construction activity parallels the movement of people and businesses and reflects differences in local economic conditions. Therefore, the number of job opportunities in a given year may fluctuate widely from area to area.

By 1995, employment of carpenters is expected to be only about 10 percent above the pre-recession level.



SOURCE: Bureau of Labor Statistics

Earnings

Median weekly earnings of carpenters who were not self employed were $340 in 1982. Weekly earnings for the top 10 percent of all carpenters were more than $580.

Union wage rates in metropolitan areas for construction carpenters were about $15.00 an hour in 1982. In comparison, the average hourly rate for production and nonsupervisory workers in private industry, except farming, was $7.67. Annual earnings, however, may be lower than hourly rates would indicate, because carpenters lose worktime in bad weather and when jobs are unavailable. Maintenance carpenters, who generally have more steady employment, averaged $11.00 an hour in 1982, according to a survey of selected metropolitan areas.

Apprentices usually start at about 50 percent of the rate paid to experienced carpenters and receive an increase of about 5 percent every 6 months.

A large proportion of carpenters are members of the United Brotherhood of Carpenters and Joiners of America.

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Related Occupations

Carpenters are highly skilled workers who specialize in construction and repair work with wood and similar materials. Other skilled construction occupations are bricklayers, cement masons, electricians, pipefitters, plasterers, plumbers, stonemasons, and terrazzo workers.

Sources of Additional Information

For information about carpentry apprenticeships or other work opportunities in this trade, contact local carpentry contractors, a local of the union mentioned above, a local joint union-contractor apprenticeship committee, or the nearest office of the State employment service or State apprenticeship agency.

For general information about this trade, contact:

Associated General Contractors of America, Inc., 1957 E St. NW., Washington, D.C. 20006.

National Association of Home Builders, Manpower Development and Training Department, 15th and M St. NW., Washington, D.C. 20005.

United Brotherhood of Carpenters and Joiners of America, 101 Constitution Ave. NW., Washington, D.C. 20005.

Associated Builders and Contractors, Inc., 729 15th St. NW., Washington, D.C. 20005.

Cement Masons and Terrazzo Workers

(D.O.T. 844.364-010, -014, .461-010, .684-010; and 861.381-046, and -050)

Nature of the Work

Cement masons place and finish concrete for many types of construction projects. The projects range from small jobs, such as patios and floors, to huge dams or miles of concrete highway. On small projects, a mason, assisted by one or two laborers, may do all of the masonry work; on large projects, a crew of several masons and many laborers may be employed. Among other tasks, cement masons may color concrete surfaces, expose aggregate in walls and sidewalks, or fabricate concrete beams, columns, and panels.

Terrazzo workers create attractive walkways, floors, patios, and panels by exposing marble chips and other fine aggregates on the surface of finished concrete. However, much of the preliminary work of terrazzo workers is similar to that of cement masons.

In preparing a site for placing concrete, cement masons make sure the forms for holding the concrete are set for the desired pitch and depth and are properly aligned. Masons direct the placing of the concrete and supervise laborers who use shovels or special tools to spread the concrete. Masons then guide a straightedge (a long, straight piece of wood or metal) back and forth across the top of the forms to level the freshly poured concrete.

Immediately after leveling the concrete, masons carefully pass a bull float, a tool about 8 by 48 inches with a long handle, over the surface with sweeping motions which cover coarser materials and bring a rich mixture of concrete to the surface.

After floating, masons wait until any excess water evaporates and the concrete is firm and workable enough to complete the finishing process. Finishers first press an edger gently between the forms and the concrete and guide it carefully along the edge and the surface. This produces slightly rounded edges and helps prevent chipping or cracking. For joints, finishers use a flat tool that has a smooth ridge protruding from the center. At specified spacings, workers make joints or grooves that help control cracking on the surface.

Next, finishers trowel the surface with a powered trowel or by hand with a float—a small, smooth, rectangular metal tool—over the entire surface. Floating embeds the heavier material deeper into the concrete, removes most imperfections, and brings the finer material—sand and cement—to the surface.

As the final step, masons sweep the concrete surface back and forth with a trowel to create a smooth finish. Although powered trowels may be used for large areas, corners, edges, and other relatively inaccessible areas must be finished by hand.

Masons also produce other finishes. For a coarse, nonskid finish, masons brush the surface with a broom or stiff bristled brush. For a pebble finish, they embed small gravel chips into the surface, leaving the tops of the chips exposed. For a neat appearance, they wash any excess cement from the exposed chips with a mild acid solution. For color, they sprinkle on a dye which they work into the surface with float and trowel.

On concrete surfaces that will remain exposed after forms are stripped, such as columns, ceilings, and wall panels, cement masons locate and correct any defects. First, they chisel away high spots and loose concrete, fill any large indentations with a mortar mixture, and smooth the surface with a rubbing brick. Finally, they coat the exposed area with a rich cement mixture and use either a rubber float or a coarse cloth to rub the concrete to a uniform finish.

Some cement masons specialize in laying a mastic coat (a fine asphalt mixture) over concrete, particularly in buildings where sound-insulated or acid-resistant floors are specified.

Cement masons must know their materials and be familiar with various chemical additives that speed or slow the setting time. The effects of heat, cold, and wind on the setting time of cement must also be considered.

Attractive, marble-chipped terrazzo requires three layers of materials. First, either cement masons or terrazzo workers build a solid, level concrete foundation that is 3 to 4 inches deep.

After the forms are removed from the foundation, workers place a 1-inch deep mixture of sandy concrete. Before this layer sets, terrazzo workers partially embed metal dividing strips into the concrete wherever there is to be a joint or change of color in the terrazzo. Workers make sure the tops of the ferrule strips are level with one another because they are to become a network of rigid dividers to separate the different designs and colors of the terrazzo panels. The strips also help prevent cracks in the finished terrazzo.

For the final layer, terrazzo workers blend and pour a fine marble chip mixture that may be color dyed into each of the panels, then hand trowel each panel until it is level with the tops of the ferrule strips. While the mixture is soft, workers toss additional marble chips of various colors into each panel. To completely embed the marble chips, workers roll a lightweight roller over the entire surface.

When the terrazzo is thoroughly dry, helpers grind it with a terrazzo grinder (somewhat like a floor polisher, only much heavier). The surface is ground until it is even with the tops of the ferrule strips. Next, slight depressions left by the grinding are filled with a matching grout material and hand troweled for a smooth, uniform surface. Terrazzo workers then clean, polish, and seal the dry surface for a rich, lustrous finish.

Working Conditions

Concrete or terrazzo work is fast paced and strenuous. Since most finishing is done at floor level, workers must bend and kneel. Some jobs are outdoors; however, work generally is halted during rain or freezing weather. To avoid chemical burns from uncured concrete and sore knees from frequent kneeling, many workers wear kneepads. Workers usually wear water-repellent boots to protect their shoes.

Employment

Cement masons and terrazzo workers held about 95,000 jobs in 1982; terrazzo workers accounted for a very small proportion of this group. This estimate represents about 15,000 fewer jobs than in 1980, a decline that reflects the severe dropoff in construction activity during the 1981-82 recession. Cement masons work for general contractors who construct projects such as highways or large buildings, and for contractors who do only concrete work. A small number of masons are employed by municipal public works departments, public utilities, and manufacturing firms that do their own construction work. Most terrazzo workers work for special trade contractors who install decorative floors and wall panels.

About 1 out of 10 cement masons and terrazzo workers is self-employed, a smaller proportion than in other building trades. Most self-employed masons specialize in small jobs, such as driveways, sidewalks, and patios; most terrazzo workers specialize in floors.

Training, Other Qualifications, and Advancement

Cement masons and terrazzo workers learn their trades either through on-the-job training as helpers or through 2- or 3-year apprenticeship programs. Many masons first gain experience as construction laborers.

On-the-job training programs consist of informal instruction from experienced workers in which helpers learn to use the tools, equipment, machines, and materials of the trade. They begin with tasks such as edging and jointing and

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A cement mason uses edging tool to provide a finished appearance.

using a straightedge on freshly placed concrete. As they advance, assignments become more complex, and apprentices usually can do finishing work within a short time.

Two- and three-year apprenticeship programs, usually jointly sponsored by local unions and contractors, provide on-the-job training in addition to 144 hours of classroom instruction each year. A written test and a physical exam may be required in certain areas. In the classroom, apprentices learn applied mathematics and safety. Apprentices generally receive special instruction in layout work and estimating costs.

When hiring helpers and apprentices, employers prefer high school graduates who are at least 18 years old, in good physical condition, and licensed to drive. The ability to get along with others also is important because cement masons work in groups. High school courses in shop mathematics and blueprint reading or mechanical drawing provide a helpful background.

Experienced cement masons or terrazzo workers may advance to supervisors or contract estimators, or may open concrete contracting businesses.

Job Outlook

Employment of cement masons and terrazzo workers is expected to grow faster than the average for all occupations through the mid-1990's. Some of this growth reflects a rebounding of employment to prerecession levels. As the population and the economy grow, more masons will be needed to help build apartments, highways, offices, industrial buildings, and other structures. The greater use of concrete as a building material—particularly in nonresidential construction—also will add to the demand for these workers. Prestressed concrete columns and beams, for example, are increasingly replacing structural steel in large buildings. Although many job openings will be created by increased demand for these workers, most openings will arise as experienced workers retire, die, or leave the occupation for other reasons.

Employment of cement masons and terrazzo workers, like that of many construction occupations, is sensitive to ups and downs in the economy. Workers in these trades can experience periods of unemployment, particularly when the level of nonresidential building falls. On the other hand, temporary shortages of these workers may occur in some areas during peak periods of building activity.

Earnings

Median weekly earnings for cement masons were about $370 in 1982. The middle 50 percent had earnings that ranged between $217 and $430 weekly. Self-employed masons may earn more. Union wage rates in metropolitan areas for cement masons were $14.25 an hour; and mosaic and terrazzo workers averaged $13.90 an hour. In comparison, the average wage for all nonsupervisory and production workers in private industry, except farming, was $7.67 an hour. Union workers generally have higher wage rates than nonunion workers. Apprentices usually start at 50 to 60 percent of the rate paid to experienced cement masons or terrazzo workers.

Annual earnings for cement masons, terrazzo workers, and apprentices generally are lower than hourly rates would indicate because the annual number of hours they work can be adversely affected by poor weather and fluctuations in construction activity.

Cement masons usually receive premium pay for hours worked in excess of the regularly scheduled workday or workweek. They often work overtime, because once concrete has been poured, the job must be completed.

A large proportion of cement masons and terrazzo workers belong either to the Operative Plasterers' and Cement Masons' International Association of the United States and Canada, or to the International Union of Bricklayers and Allied Craftsmen.

Related Occupations

Cement masons and terrazzo workers combine skill with knowledge of building materials to construct buildings, highways, and other structures. Other occupations involving similar skills and knowledge include bricklayers, form builders, marble setters, ironworkers, plasterers, stonemasons, and tilesetters.

Sources of Additional Information

For information about apprenticeships and work opportunities, contact local cement finishing contractors; locals of unions previously mentioned; a local joint union-management apprenticeship committee; or the nearest office of the State employment service or apprenticeship agency.

For general information about cement masons and terrazzo workers, contact:

Associated General Contractors of America, Inc., 1957 E St. NW., Washington, D.C. 20006.

International Union of Bricklayers and Allied Craftsmen, International Masonry Institute Apprenticeship and Training, 815 15th St. NW., Washington, D.C. 20005.

Operative Plasterers' and Cement Masons' International Association of the United States and Canada, 1125 17th St. NW., Washington, D.C. 20036.

Portland Cement Association, 5420 Old Orchard Rd., Skokie, Ill. 60077.

Prestressed Concrete Institute, 201 N. Wells St., Chicago, Ill. 60606.

Drywall Applicators and Tapers

(D.O.T. 842.381-010, .664-010, and .681-010; and 869.684-050)

Nature of the Work

Developed as a substitute for wet plaster, drywall consists of a thin layer of plaster sandwiched between two pieces of heavy paper. It is used today for walls and ceilings of many new homes and buildings because it saves both time and money compared to traditional construction using plaster.

Two occupations have emerged from the widespread use of this construction material: Drywall applicators and drywall tapers. Applicators, also called installers, fasten drywall panels to the framework inside houses and other buildings. Tapers, or finishers, do touchup work to get the panels in shape for painting.

Because drywall panels are manufactured in standard sizes—for example, 4 feet by 8 or 12 feet—installers must measure and cut some pieces to fit around doors and windows. They also saw holes in panels for electric outlets, air-conditioning units, and plumbing. After making these alterations, applicators may glue,

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nail, or screw the wallboard panels to the wood or metal framework. Because drywall is heavy and cumbersome, a helper assists the installer in positioning and securing the panel. When placing ceiling panels, a lift often is used to assist the crew.

After installing the drywall, tapers fill joints between panels with a joint compound. Using the wide, flat tip of a special trowel, and brushlike strokes, they spread the joint compound into and along each side of the joint. Immediately, the finishers use trowels to press a perforated paper tape into the wet compound and to scrape away excess material. Nail and screw depressions also are covered with this compound. On large commercial projects, finishers may use automatic taping tools to apply the joint compound and tape in one step. When the first application of compound is dry, finishers apply another coat to fill any depressions and to make a smooth surface. The third or finish coat is applied in the same manner as the second coat and effectively covers all joints and fasteners. Sanding makes patched areas as smooth as the rest of the wall surface. Some finishers apply textured surfaces to walls and ceilings with trowels, brushes, or spray guns. Finishers also repair nicks and cracks caused by the installation of air-conditioning vents and other fixtures. Some finishers specialize in sanding, taping, or repair work.

In many instances, carpenters install drywall and painters tape and finish it.

Working Conditions

As in other construction trades, drywall work sometimes is strenuous. Applicators and tapers spend most of the day on their feet, either standing, bending, or squatting. Installers have to lift and maneuver heavy panels. Hazards include the possibility of falls from ladders and injuries from power tools. Because sanding joint compound to a smooth finish may create a great deal of dust, some finishers wear masks for protection.

Drywall applicators use screwguns to attach panels to framework.

Employment

Drywall applicators and tapers held about 76,000 jobs in 1982, about 10,000 fewer than in 1980. This decline reflects the severe dropoff in construction activity—particularly homebuilding—during the 1981-82 recession. Most worked for contractors who specialize in drywall installation; others worked for contractors who do all kinds of construction.

Installers and finishers are employed throughout the country, but are concentrated in urban areas.

Training, Other Qualifications, and Advancement

Most drywall applicators and tapers start as helpers and learn most of their skills on the job. Applicator helpers start by carrying materials, lifting and holding panels, and cleaning up debris. Within a few weeks, they learn to measure, cut, and install panels. Eventually, they become experienced installers.

Taper helpers begin by taping joints and touching up nail holes and scratches. They soon learn to install corner guards and to conceal openings around pipes. Near the end of their training, both applicator helpers and taper helpers learn to estimate costs of installing and finishing drywall.

Some installers learn their trade in an apprenticeship program. The United Brotherhood of Carpenters and Joiners of America, AFL-CIO, in cooperation with local contractors, administers an apprenticeship program in carpentry that includes instruction in drywall installation. In addition, local affiliates of the Associated Builders and Contractors conduct a similar training program for nonunion workers. The International Brotherhood of Painters and Allied Trades conducts a 2-year apprenticeship program for drywall finishers.

Employers prefer high school graduates who are in good physical condition, but they frequently hire applicants with less education. High school or vocational school courses in carpentry provide a helpful background for drywall work. Installers must be good at simple arithmetic.

After qualifying as an installer or finisher, a person who has leadership ability may become a supervisor within a few years. Some workers start their own drywall contracting businesses.

Job Outlook

Employment of drywall workers is expected to grow faster than the average for all occupations through the mid-1990's. Besides workers hired to fill openings arising from increased demand, many will be needed to replace those who take jobs in other occupations, retire, or die.

Employment opportunities may be more favorable in commercial construction than in residential construction, which is usually more sensitive to increases in interest rates.

Drywall installation and finishing is indoor work. Unlike some other construction trades, these workers seldom lose time because of adverse weather conditions.

Most job openings will be in metropolitan areas. Building contractors in small cities may not have enough business to hire full-time drywall workers.

Earnings

Median weekly earnings for drywall applicators and tapers were about $355 in 1982. One-half earned between $260 and $490 weekly, and the top 10 percent earned more than $615 a week.

Union drywall tapers in metropolitan areas had estimated hourly earnings of $14.55 in 1982, according to limited information available. This was nearly twice the hourly average for all nonsupervisory and production workers in private industry, except farming. Trainees start at about half the rate paid to experienced workers.

Some contractors pay installers and finishers according to the number of drywall panels they install or finish per day. A 40-hour week is standard for installers and finishers, but they sometimes work longer. Those who are paid hourly rates receive premium pay for overtime.

Some installers are members of the United Brotherhood of Carpenters and Joiners of America, and some finishers are members of the International Brotherhood of Painters and Allied Trades.

Related Occupations

Drywall installers and finishers combine strength and dexterity and a capacity for precision and accuracy to make materials fit according to a set plan. Other occupations that require similar abilities include insulation workers, lathers, floor covering installers, plasterers, and form builders.

Sources of Additional Information

For information about work opportunities in drywall application and finishing, contact local drywall installation contractors; a local of the unions previously mentioned; a local joint union-management apprenticeship committee; a State or local chapter of the Associated Builders and Contractors; or the nearest office of the State employment service or State apprenticeship agency.

For details about job qualifications and training programs, write to:

Associated Builders and Contractors, Inc., 729 15th St. NW., Washington, D.C. 20005.

International Brotherhood of Painters and Allied Trades, 1750 New York Ave. NW., Washington, D.C. 20006.

National Joint Painting, Decorating, and Drywall Apprenticeship and Training Committee, 1750 New York Ave. NW., Washington, D.C. 20006.

Electricians

(D.O.T. 820.261, .381-010; 821.261-018, .381-014, -018; 824.261-010, -014, .281-010, -014, .681-010; 825.281-010, -014, -026, .381-018, -022, -030, -034, -038; 828.381-010; and 829.281-014)

Nature of the Work

Heating, lighting, power, air-conditioning, and refrigeration components all operate through

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electrical systems that are assembled, installed, and maintained by electricians. Electricians generally specialize in either construction or maintenance, although some workers do both.

To install the electrical systems in factories, homes, and other structures, electricians follow blueprints as well as instructions from supervisors. To install wiring in factories and offices, they first place conduit (pipe or tubing) inside partitions, walls, or other concealed areas as designated by building plans. Workers also fasten to the wall small metal and plastic boxes that will house electrical switches and outlets. To complete circuits between these boxes, they then pull insulated wires or cables through the conduit. They work carefully to avoid damaging any wires or cables. In lighter construction, such as housing, plastic-covered wire usually is used rather than conduit.

Regardless of the type of wire being used, electricians connect it to circuit breakers, transformers, or other components. Wires are joined by twisting ends together with pliers and covering the ends with special plastic connectors. When additional strength is desired, they may use an electric "soldering gun" to melt metal onto the twisted wires, then cover them with durable, electrical tape. When the wiring is finished, they test the circuits for proper connections.

Maintenance work varies greatly, depending on where the electrician is employed. Electricians who work in large factories may repair particular items, such as motors or electronic devices. Those in office buildings and small plants usually fix all kinds of electrical equipment. Electricians spend much of their time doing preventive maintenance—periodic inspection of equipment to locate and correct defects before breakdowns occur. When trouble occurs, they must find the cause and make repairs. Electricians may replace items such as fuses, switches, or wire. They also may advise management whether continued operation of equipment would be hazardous, and they may install new electrical equipment.

Electricians use handtools such as screwdrivers, pliers, knives, and hacksaws. They also use power tools and test meters.

Working Conditions

Electricians' work is active and sometime strenuous. They often climb ladders and work on scaffolds. They frequently work in awkward or cramped positions. Electricians risk injury from electrical shock, falls, and cuts from sharp objects. They are taught to use protective equipment and clothing and to follow National Electric Code specifications and procedures as well as requirements of State, county, and municipal electrical codes.

Employment

Electricians held 542,000 jobs in 1982, 15,000 fewer than in 1980, reflecting the decline in construction and manufacturing during the 1981-82 recession. About half the jobs were in the construction industry. Maintenance jobs for electricians are concentrated in manufacturing industries such as automobile, ship, machinery, chemical, and iron and steel production. Public utilities, mines, railroads, and governments also employ some electricians. About 1 out of 8 electricians is self-employed. Like the general population, electricians are concentrated in industrialized and urban areas.

About half of all electricians work in the construction industry.

Training, Other Qualifications, and Advancement

Most training authorities recommend the completion of a 4-year apprenticeship program as the best way to learn the electrical trade because apprenticeship gives trainees a thorough knowledge of the trade and improves their ability to find jobs during their work life. Compared to most other trades, a large proportion of electricians are trained through apprenticeship.

Apprenticeship programs are sponsored through and supervised by local union-management committees or by company management committees. Because the training is comprehensive, people who complete apprenticeship programs qualify to do both maintenance and construction work. These programs provide 144 hours of classroom instruction each year in addition to on-the-job training. In the classroom, apprentices learn blueprint reading, electrical theory, electronics, mathematics, electrical code requirements, and safety and first aid practices. On the job, under the supervision of experienced electricians, apprentices must demonstrate mastery of the electrician's work. At first, apprentices drill holes, set anchors, and set up conduit. Later, they measure, bend, and install conduit, as well as install, connect, and test wiring. They also learn to set up and draw diagrams for entire electrical systems.

Beginners who are not apprentices can pick up the trade informally by working as helpers for experienced electricians. While learning to install conduit, connect wires, and test circuits, helpers are also taught safety practices. Many helpers gain additional knowledge through trade school or correspondence courses, or through special training in the Armed Forces.

All applicants should be in good health and have at least average physical strength. Agility and dexterity also are important. Good color vision is needed because workers frequently must identify electrical wires by color. Applicants for apprentice positions usually must be at least 18 years old and have a high school or vocational school diploma. Courses in electricity, electronics, mechanical drawing, science, algebra, and shop provide a good background.

To obtain a license, necessary for employment in most localities, electricians must pass an examination that tests their knowledge of electrical theory, the National Electric Code, and local electric and building codes.

Experienced electricians can become supervisors. Electricians with sufficient capital and management skill can start their own contracting businesses. In many areas, a contractor must have an electrical contractor's license.

Job Outlook

Employment of electricians is expected to increase faster than the average for all occupations through the mid-1990's. Some of this growth reflects a rebounding of employment to prerecession levels. As population and the economy grow, more electricians will be

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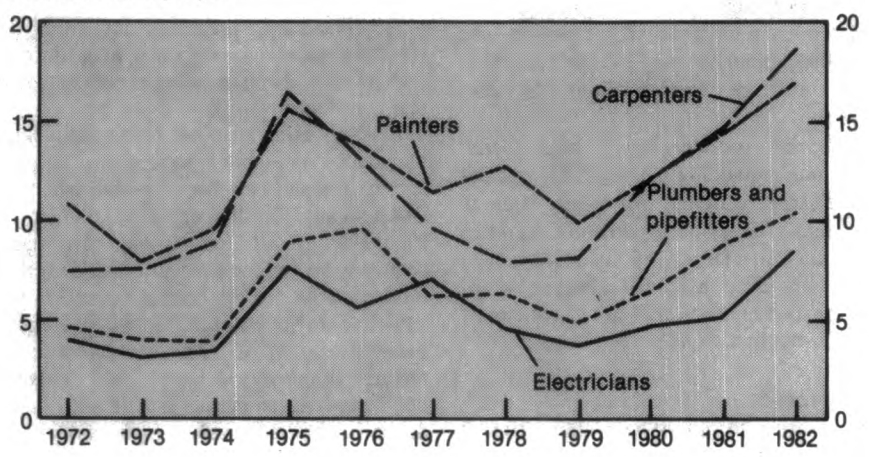
The unemployment rate for electricians generally is lower than the rates for other construction workers.



SOURCE: Bureau of Labor Statistics

needed to maintain the electrical systems used by industry and to install electrical fixtures and wiring in new homes, factories, offices, and other structures.

In addition to jobs created by increased demand for electricians, many openings will occur as electricians transfer to other occupations or leave the labor force. The total number of job openings for electricians each year is among the highest for all craft occupations, mainly because the occupation is large. A smaller proportion of electricians than of other craft workers leave their occupation each year. Electricians have a strong attachment to their occupation because they must spend about 4 years acquiring their training and enjoy relatively high earnings.

Although the employment outlook for electricians is expected to be good over the long run, people wishing to become construction electricians should expect to experience periods of unemployment. These result from the limited duration of construction projects and the cyclical nature of the construction industry. During economic downturns, job openings for electricians are reduced as the level of construction declines. Although employment of maintenance electricians is steadier than that for construction electricians, electricians working in the automobile, steel, and other industries that are sensitive to cyclical swings in the economy may be laid off during recessions.

Job opportunities for electricians also vary by geographic area. Employment opportunities follow the movement of people and businesses among States and local areas and reflect differences in local economic conditions. The number of job opportunities in a given year may fluctuate widely from area to area.

Earnings

Median weekly earnings for full time electricians, who were not self-employed, were $430 in 1982. Most earned between $335 and $560 weekly in 1982. The lowest 10 percent earned less than $255 while the highest 10 percent earned more than $675. Union wage rates in metropolitan areas for construction electricians were about $16.00 an hour in 1982, compared with $7.67 an hour for all production and nonsupervisory workers in private industry, except farming. Maintenance electricians in metropolitan areas earned about $12.00 in 1982. They generally earn more in the Midwest and West than in the Northeast and South. Because the seasonal nature of construction affects electricians less than workers in most building trades, annual earnings also tend to be higher.

Apprentice wage rates start at from 40 to 50 percent of the rate paid to experienced electricians and increase periodically.

Many construction electricians are members of the International Brotherhood of Electrical Workers.

Among unions organizing maintenance electricians are the International Brotherhood of Electrical Workers; the International Union of Electrical, Radio and Machine Workers; the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (Ind.); and the United Steelworkers of America.

Related Occupations

To install and maintain electrical systems, electricians combine manual skill and a knowledge of electrical materials and concepts. Other occupations involving similar skills include air-conditioning mechanics, cable installers and repairers, electronics mechanics, and elevator constructors.

Sources of Additional Information

For details about apprenticeships or other work opportunities in this trade, contact local electrical contractors; local chapters of the Independent Electrical Contractors, Inc., the National Electrical Contractors Association, or the Associated Builders and Contractors; a local union of the International Brotherhood of Electrical Workers; a local union-management apprenticeship committee; local firms that employ maintenance electricians; or the nearest office of the State employment service or State apprenticeship agency. Some local employment service offices screen applicants and give aptitude tests.

For general information about the work of electricians, contact:

Independent Electrical Contractors, Inc., 1101 Connecticut Ave. NW., Suite 700, Washington, D.C. 20036.

International Brotherhood of Electrical Workers, 1125 15th St. NW., Washington, D.C. 20005.

National Electrical Contractors Association, 7315 Wisconsin Ave., Bethesda, Md. 20814.

National Joint Apprenticeship and Training Committee for the Electrical Industry, 9700-E George Palmer Hwy., Lanham, Md. 20706.

Associated Builders and Contractors, 729 15th St. NW., Washington, D.C. 20005.

Floor Covering Installers

(D.O.T. 622.381-026; 789.484-010; 861.381-034; 864.381-010, .481-010, and -014; and 929.381-010)

Nature of the Work

Floor covering installers (also called floor covering mechanics) install and replace carpet or resilient floor covering materials such as tile, linoleum, and vinyl sheets. These workers install coverings over floors made of wood, concrete, or other materials. They generally specialize in either carpet or resilient floor covering installation, although some do both.

Before putting down resilient covering, such as vinyl tile, installers first inspect the floor to be sure that it is firm, dry, smooth, and free of oil, grease, or paint. Some floors have to be prepared for covering. For example, installers may sand a rough or painted floor and fill cracks and indentations. An extremely uneven floor may be resurfaced with wood or other approved underlayments.

On newly poured concrete floors or floors laid below grade level, installers must test for moisture. If too much moisture is present, they may suggest postponing installation of floor covering or recommend a covering technique more appropriate for the floor's condition.

Resilient flooring installers measure and mark off the floor according to a plan. The plan may be architectural drawings that specify every detail of the covering design, or a simple, verbal description by the supervisor. When the measurements are completed, installers, often assisted by apprentices or helpers, cut, fit, and cement the flooring into place. After the flooring mechanic lays out the room, square tile is set and aligned by hand to match with adjacent tiles. Sheet flooring is laid out and rolled with a roller in a fashion similar to that of rolling out pie dough. The flooring must be carefully cut,

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particularly at door openings, along irregular wall surfaces, and around fixtures, such as columns or pipes. Installers also must take special care in cutting out and arranging decorative designs. After the flooring is in place, they use a roller to insure good adhesion.

Carpet installers, like installers of resilient coverings, first inspect the floor to determine its condition. Then they plan the layout after allowing for expected traffic patterns and, if necessary, for seams so that best appearance and long wear will be obtained.

For wall-to-wall carpet, installers lay and tack an underlay—a foam rubber pad 1/4 to 1/2 inch thick that is cut slightly smaller than the entire floor. Next, they roll out, measure, mark, and cut the carpet, allowing for 3 to 4 inches of extra carpet on each side. This provides some leeway for the final fitting. Workers then lay the carpet and stretch it to fit evenly against the floor and snugly against each wall and door threshold. With the carpet stretched, the excess around the perimeter is cut to fit the room precisely. To hold the carpet in place, workers either tack or tape each edge of the carpet to the floor.

Because carpet comes in standard 12-foot widths, wall-to-wall installations in large rooms require that the sections be joined. To do this, installers either hand-sew seams with a large needle and special thread or heat-tape seams with a hot, flat iron to melt the plastic surface of a foil-backed tape placed beneath the joined sections of carpet. Sections of carpet placed edge to edge are pressed to the surface of the melted plastic to force it into the carpet's backing. When cooled, the hardened plastic joins the sections.

For precut, edge-bound carpet, installers simply lay a foam rubber pad on the floor and roll the carpet over the slightly smaller pad. To hold the pad and carpet in place, installers may apply tape that has adhesive on both sides to the bottom edges of the carpet.

Working Conditions

Installers work under better conditions than most other construction workers. Because floor coverings are finished products designed almost exclusively for interior use and display, work areas usually are clean, safe, and comfortable.

Installers generally work regular daytime hours. Particular circumstances, however, such as installing a floor covering in a store or office, may require work during evenings and weekends.

On the job, installers kneel, reach, bend, stretch, and frequently lift heavy loads, such as a roll of carpet, activities that require strength and stamina. They also must drill, cut, hammer, and use hot irons. Despite continual movement and frequent use of hand and power tools, installers experience fewer injuries than most other construction workers.

Employment

Floor covering installers held about 79,000 jobs in 1982. About two-thirds of all installers work primarily with carpet, and the remainder with resilient flooring. Most work for flooring contractors. Many others work for retailers of floor covering. About 4 of 10 floor covering installers are self-employed, a higher proportion than the average for all construction occupations.

Installers are employed throughout the Nation, but are concentrated in urban areas that have high levels of construction activity.

Training, Other Qualifications, and Advancement

The vast majority of floor covering installers learn their trade informally on the job by working as helpers to experienced installers. Others learn through formal apprenticeship programs, which include on-the-job training as well as related classroom instruction.

Informal training programs usually are sponsored by individual contractors and generally last about 1 1/2 to 2 years. Helpers begin with simple assignments. Helpers on resilient flooring jobs carry materials and tools, prepare floors for the tile, and help with its installation. Carpet helpers install tackless stripping and padding, and help stretch newly installed carpet. With experience, helpers in either trade take on more difficult assignments, such as measuring, cutting, and fitting the materials to be installed.

Apprenticeship programs and some contractor-sponsored programs provide comprehensive training that covers both carpet and resilient flooring work.

Floor covering installers occasionally attend manufacturers' schools to upgrade job skills and learn about new flooring materials.

Applicants for helper or apprentice jobs should be at least 16 years old, have manual dexterity, and be mechanically inclined. Since trainees often are required to drive company vehicles, employers prefer individuals who are licensed to drive and who have good driving records. Employers also want individuals who will be courteous, tactful, and an asset in their dealings with customers. A high school education also is preferred, though not necessary. Courses in general mathematics and shop may provide a helpful background.

Floor covering installers may advance to supervisors or installation managers for large floor laying firms. Some installers become salespersons or estimators. Installers also may go into business for themselves.

Job Outlook

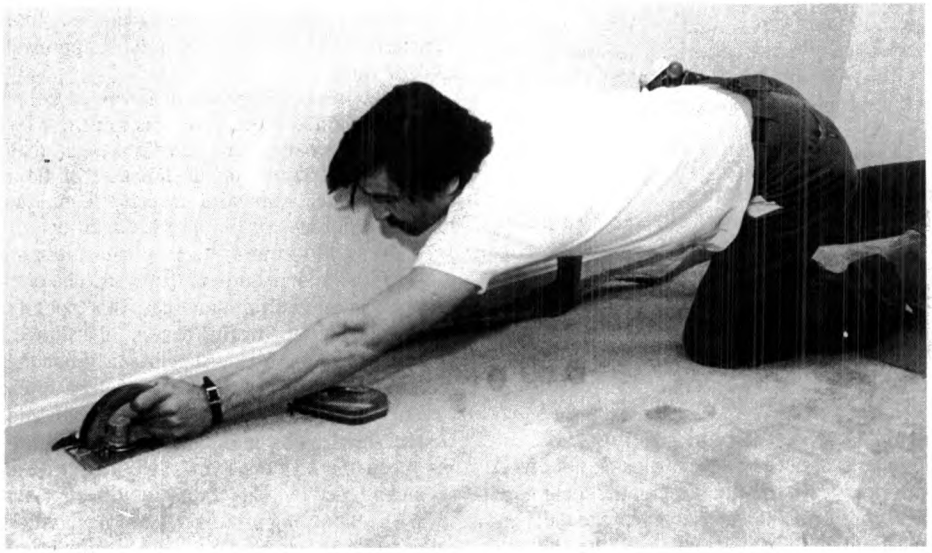
Employment of floor covering installers is expected to grow about as fast as the average for all occupations through the mid-1990's. In addition to job openings resulting from growth in demand for floor covering installers, additional openings will arise as experienced installers transfer to other occupations, retire, or die. Employment of floor covering installers is expected to keep pace with the expected expansion in construction and the widespread use of resilient floor coverings and carpeting. Because many new buildings have plywood rather than hardwood floors, wall-to-wall carpet or resilient floors will be a necessity. Carpet and resilient flooring also will continue to be used extensively in renovation work. Moreover, versatile materials and colorful patterns will contribute to the growing demand for floor coverings.

This occupation is less sensitive to changes in economic conditions than most other construction crafts. Because much of their work is done in existing buildings, employment generally remains stable even when construction activity declines.

Earnings

Median weekly earnings for full-time carpet installers were about $300 in 1982. One-half earned between $220 and $440 a week; the top 10 percent earned over $545. Limited information indicates that installers who work with resilient flooring earn similar wages. Starting wage rates for apprentices and other trainees usually are about half of the experienced worker's rate.

Most installers are paid by the hour. In some shops, part of the pay may be in bonuses. In others, installers receive a monthly salary or are paid according to the amount of work they do.



Floor covering installers spend most of their workday in a kneeling or squatting position.

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Some floor covering installers belong to the United Brotherhood of Carpenters and Joiners of America, or the International Brotherhood of Painters and Allied Trades.

Related Occupations

Floor covering installers skillfully combine strength and stamina with an eye for accuracy and an appreciation for detail to produce attractively finished floors. Other occupations involving different products but which require similar skills include appliance repairers, house repairers, lathers, meatcutters, painters, riveters, and roofers.

Sources of Additional Information

For details about apprenticeships or work opportunities, contact local flooring contractors or retailers; locals of the unions previously mentioned; or the nearest office of the State apprenticeship agency or the State employment service.

For general information about the work of floor covering installers, contact:

Carpet and Rug Institute, P.O. Box 2048, Dalton, Ga. 30720.

Glaziers

(D.O.T. 865.361-010, .381-010 and -014, .484-010, .684-018 and -022)

Nature of the Work

Glass serves many uses in modern buildings. Insulating glass keeps in warmed or cooled air; tempered and wire glass makes doors and windows more secure; and large glass panels give skyscrapers a distinctive look while reducing the need for artificial lighting. Glaziers select, cut, install, and remove all types of glass as well as plastics and similar materials used in place of glass. They also install mirrors, tempered glass doors, the metal hardware used in setting glass, and automatic doors.

For most jobs, the glass is precut and mounted in metal frames at a factory. It arrives at the job site ready to be positioned and secured in place by glaziers. Glaziers may use a crane or hoist with suction cups attached to lift a large, heavy piece of glass. In all cases, however, to prevent shattering, glaziers use their hands to guide and position the glass.

For some jobs glass is cut at a contractor's shop by automated scoring and breaking machines. At the site glaziers secure glass in place with materials such as mastic—a pastelike cement—bolts, rubber gaskets, putty, metal clips, and metal or wood molding. When using a rubber gasket—a thick molded rubber half tube with a split running its length—to secure window glass they first position the gasket around the window opening, then set the glass into the split side of the gasket, causing it to clamp to the edges and hold the glass firmly in place.

When metal clips and molding are used to secure window glass, glaziers secure the molding to the window opening, place the glass in the molding, and force springlike metal clips between the glass and the molding. The clips exert pressure and keep the glass firmly in place.

When using putty, workers first spread it neatly against and around the edges of the molding on the inside of the window opening. Next, they install the glass. Pressing it against the putty on the inside molding, workers screw or nail outside molding that loosely holds the glass in place. To hold it firmly, they pack the space between the molding and the glass with putty and then trim any excess putty with a putty knife.

For some jobs, the glazier must cut the glass manually. To prepare the glass for cutting, glaziers rest it either on edge on a rack or A-frame or flat against a cutting table. They then measure and mark the glass for the cut.

Glaziers cut glass with a special tool that has a very hard metal wheel about 1/6 inch in diameter. Using a "straighted" as a guide, the glazier presses the cutter's wheel firmly on the glass, guiding and rolling it carefully to make a score just below the surface. To help the cutting tool move smoothly across the glass, workers brush a thin layer of light weight oil along the line of the intended cut or dip the cutting tool in oil. Immediately after cutting, the glazier presses on the short end to break the glass cleanly along the cut.

In addition to handtools such as glasscutters and putty knives, glaziers use power tools such as hoists, saws, drills, cutters, and grinders.

Working Conditions

When installing large pieces of glass, glaziers work in teams. They may travel for a day or two to job sites in areas where few people, if any, are equipped and qualified to install glass in commercial buildings such as stores.

Glaziers may work outdoors in uncomfortable weather. Sometimes they work on scaffolds at great heights. In addition, the job requires a considerable amount of bending, stooping, lifting, and standing. Glaziers may be injured by broken glass or cutting tools, falls from scaffolds, or from lifting glass.

Employment

Glaziers held about 41,000 jobs in 1982. Most worked for glazing contractors engaged in new construction, alteration, and repair or for glass and hardware stores that install or replace glass. Others worked for government agencies or businesses that do their own construction. Glaziers work throughout the country, but jobs are concentrated in metropolitan areas.

Training, Other Qualifications, and Advancement

Training authorities recommend that glaziers learn the trade through an apprenticeship program that lasts 3 to 4 years. However, many glaziers learn the trade informally on the job by assisting experienced workers.

Apprenticeship programs, which are administered by local union-management committees or local contractors' associations, consist of on-the-job training as well as 144 hours of classroom instruction and/or home study each year. On the job, apprentices learn to use the tools and equipment of the trade; handle, measure, cut, and install glass and metal framing; cut and fit moldings; and install and balance glass doors. In the classroom, they are taught basic mathematics, blueprint reading and sketching, general construction techniques, safety practices, and first aid.

Glaziers who learn this trade through informal on-the-job training usually start by carrying glass and cleaning up debris in glass shops. Eventually, helpers assist experienced workers on a simple installation job. Learning the trade this way may not provide training as complete as an apprenticeship and may take longer.

Local apprenticeship administrators determine how apprentices are recruited and selected. Applicants for apprenticeships generally must be in good physical condition and at least 17 years old. In some areas, applicants must take mechanical aptitude tests. Persons applying for helper positions will find that employers prefer high school or vocational school graduates. Courses in general mathematics, blueprint reading or mechanical drawing, general construction, and shop provide a helpful background.

For most glaziers, advancement consists of increases in pay; some may advance to supervisory jobs. Some glaziers become contractors; however, the contracting business is very competitive and managerial skill is needed to operate successfully.

Job Outlook

Employment of glaziers is expected to increase faster than the average for all occupations through the mid-1990's. Besides jobs created by increased demand for glaziers, openings will arise as experienced glaziers transfer to other occupations, retire, or die. However, because this occupation is fairly small, only a

Glaziers install mirrors as well as window glass.

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limited number of openings will become available. Employment opportunities should be greatest in metropolitan areas, where most glazing contractors and retailers are located.

Over the long run, population and business growth will create a rising demand for new residential and commercial buildings, such as apartments, offices, and stores. Since glass will continue to be popular in building design, the demand for glaziers to install and replace glass also will grow.

Glaziers may experience periods of unemployment between construction projects and during downturns in construction activity. People planning to enter the trade can improve their chances of avoiding layoffs by learning to use a variety of tools and materials because employers try to keep their most skilled workers even during business slumps.

People wishing to enter glazing apprenticeships may face competition for positions because high wages and all-round training attract many people to these programs.

Earnings

In 1982, union construction glaziers in metropolitan areas earned about $13.80 an hour. In comparison, the average hourly wage for all production or nonsupervisory workers in private industry, except farming, was $7.67. Apprentice wage rates usually start at 50 percent of the rate paid to experienced glaziers and increase every 6 months. During the final year of their training, apprentices receive 90 percent of the rate for experienced workers. Yearly earnings of glaziers and apprentices, however, generally are slightly lower than hourly rates would indicate because the annual number of hours they work can be adversely affected by poor weather and fluctuations in construction activity. Glaziers also may receive health insurance, pensions, paid vacation, and holidays.

Many glaziers employed in construction are members of the International Brotherhood of Painters and Allied Trades.

Related Occupations

Glaziers use their knowledge of construction materials and techniques to install glass. Other construction workers whose jobs also involve skilled, custom work are bricklayers, dry-wall applicators, floor layers, painters, paperhangers, stucco masons, terrazzo workers, and tile setters.

Sources of Additional Information

For more information about glazier apprenticeships or work opportunities, contact local glazing or general contractors; a local of the International Brotherhood of Painters and Allied Trades; a local joint union-management apprenticeship agency; or the nearest office of the State employment service or State apprenticeship agency.

For general information about the work of glaziers, contact:

International Brotherhood of Painters and Allied Trades, 1750 New York Ave. NW., Washington, D.C. 20006.

Associated Builders and Contractors, 729 15th St. NW., Washington, D.C. 20005.

Insulation Workers

(D.O.T. 863.364-010 and -014, .381-010 and -014, and .664-010)

Nature of the Work

Properly insulated homes and buildings reduce energy consumption by preventing loss of cool air on warm days and hot air on cold days. Meat storage rooms, steam pipes, and boilers are other examples where the wasteful transfer of heat to or from the space inside can be minimized by insulation. Installing insulating material is the responsibility of insulation workers.

Insulation workers may paste, staple, wire, tape, or spray insulation to an appropriate surface. When covering a steam pipe, for example, insulation workers measure and cut a tube of insulation to the necessary length, stretch it open along a cut that runs the length of the tube, and then slip it over the pipe. To secure the insulation, they wrap and fasten wire bands around it, tape it, or wrap a cover of tar paper, cloth, or canvas over it and then sew or staple the cover in place. Sometimes insulation workers must weld sheet metal around insulated pipes to waterproof the insulation. Care is required to cover joints completely.

When covering a wall or other flat surface, workers may use a hose to spray foam insulation onto a wire mesh. The wire mesh provides a rough surface to which the foam can cling and adds strength to the finished wall. If desired, workers apply a final coat for a finished appearance.

In attics or exterior walls, which do not require either wire mesh for adhesion or a final coat for appearance, workers often use a compressor to blow in loose-fill insulation. This is the fastest and most popular insulation method, especially in older homes that lack insulation altogether. A tender feeds the machine with shredded fiberglass insulation or rock wool, and the compressor forces this insulation through a hose. Another worker sprays the insulation from the compressor hose into the attic or between the interior and exterior walls until the required amount is installed.

In another method, insulation workers staple fiberglass batts in walls and ceilings to enclose living or working spaces in a protective blanket of insulation. This technique is used during the construction stages of the building.

Insulation workers use common handtools—trowels, brushes, scissors, sewing equipment, and stapling guns. Powersaws, as well as handtools, are used to cut and fit insulating materials. Welding machines are often used to join sheet metal or secure clamps. Compressors for blowing or for spraying insulation are also used. Some insulation workers are responsible for cleaning these machines and keeping them in good working condition.

Working Conditions

Insulation workers generally work indoors amid the clutter of construction. They spend most of the workday on their feet, either standing, bending, or squatting. Sometimes they work from ladders or in tight spaces. However, the work is not strenuous; it requires more coordination than strength. Insulation work is often dusty and dirty. The minute particles from insulation material can irritate the eyes, skin, and respiratory system. Removing asbestos materials—at one time the most common form of insulation but rarely used today—can be very dangerous. To protect themselves from the hazards of asbestos and other irritants, workers wear filtering masks and protective clothing. They also try to keep work areas as well ventilated as possible.

Employment

Insulation workers held about 47,000 jobs in 1982; most worked for insulation contractors. Others altered and maintained insulation systems in chemical factories, petroleum refineries, powerplants, and similar structures that have extensive installations for power, heating, and cooling.

Training, Other Qualifications, and Advancement

Most insulation workers learn their trade through on-the-job training programs. Trainees are assigned to experienced insulation workers for instruction and supervision. They begin with simple tasks, such as blowing insulation, supplying insulation to experienced workers, or holding the material while it is fastened in place. On-the-job training can take from 1 to 2 years, depending on where the trainee works. Learning home insulation generally requires less training than maintenance and construction work in industrial plants. When they gain experience, trainees receive less supervision, more responsibility, and higher pay.

Insulation workers wear masks and other protective gear to minimize exposure to irritants found in some insulating materials.

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In contrast, trainees in apprenticeship programs receive in-depth instruction in almost all phases of insulation. Apprenticeship programs are provided by a joint committee of local insulation contractors and the local union of the International Association of Heat and Frost Insulators and Asbestos Workers. Programs consist of 4-years of on-the-job training coupled with classroom instruction, and trainees must pass practical and written tests to demonstrate a knowledge of the trade.

For entry jobs, insulation contractors prefer high school graduates who are in good physical condition and licensed to drive. High school courses in blueprint reading, shop math, sheet-metal layout, and general construction provide a helpful background. Applicants seeking apprenticeship positions must have a high school diploma or its equivalent, and be at least 18 years old.

Skilled insulation workers may advance to supervisor, shop superintendent, or insulation contract estimator. Many insulation workers are members of the International Association of Heat and Frost Insulators and Asbestos Workers.

Job Outlook

Employment of insulation workers is expected to grow faster than the average for all occupations through the mid-1990's, as greater emphasis is placed upon energy efficiency. The need to insulate boilers and pipes in new factories and power plants will stimulate employment growth. Moreover, existing buildings that need extra insulation to save fuel will add to employment requirements. In addition to jobs created by increased demand for insulation work, openings will arise as workers transfer to other occupations, retire, or die.

Insulation workers in the construction industry may experience periods of unemployment. Building activity is affected not only by seasonal patterns, but also by fluctuations in the business cycle.

Workers maintaining and repairing insulation systems in industrial plants will experience more stable employment than those in construction because maintenance and repair must be done regardless of the state of the economy.

Unlike other construction occupations, insulation workers usually do not lose worktime when weather conditions are poor. Most insulation is applied after buildings are enclosed.

Employment opportunities will be best in metropolitan areas, where most insulation contractors are located. In small towns, much of the insulation work is done by persons in other trades, such as heating and air-conditioning installers, carpenters, and drywall installers.

Earnings

Median weekly earnings for insulation workers working full time were about $325 in 1982. Most insulation workers earned between $250 to $450 a week; some earned more than $600 weekly. Union insulation workers working primarily in commercial and industrial construction had estimated average wages of $14.75 an hour in 1982, according to the limited information available. This was about twice the hourly rate paid to all nonsupervisory and production workers in private industry, except farming. Apprentice wage rates start at about half the rate paid to experienced workers and increase periodically.

The wide disparity in earnings for insulation workers can be explained simply. One group works primarily in commercial and industrial projects in nonresidential construction. Another larger, less skilled group installs insulation in residential construction (new and existing dwellings) and earns substantially less.

Related Occupations

Insulation workers combine a knowledge of insulation materials with their skills of application to provide effective barriers to heat, moisture, and sound. Other occupations involving similar skills include air-conditioning installers, carpet layers, drywall applicators, floor layers, lathers, and roofers.

Sources of Additional Information

For information about training programs or other work opportunities in this trade, contact a local insulation contractor; a local of the International Association of Heat and Frost Insulators and Asbestos Workers; the nearest office of the State employment service or State apprenticeship agency, or:

National Insulation Contractors Association, 1025 Vermont Ave. NW., Suite 410, Washington, D.C. 20005.

Ironworkers

(D.O.T. 801.361-014, -018 and .684-026)

Nature of the Work

Ironworkers erect the steel framework of buildings, bridges, and other structures. In addition, ironworkers install steel stairs or add window guards to buildings, and do repair work, such as replacing metal bridge parts. They also position steel bars and wire mesh to reinforce concrete floors, columns, and other structural spans.

High-rise buildings, bridges, and power transmission towers have frames made of steel columns, beams, and girders. Ironworkers erect these steel frames and assemble the cranes and derricks that move structural steel, reinforcing bars, buckets of concrete, and other materials around the construction site. The hoisting equipment arrives at the construction site in sections, where it is lifted into position by a mobile crane. Ironworkers then connect the sections and set up the cables that do the hoisting.

Working from blueprints or instructions from supervisors, these workers erect frameworks by connecting steel columns, beams, and girders. The steel is delivered to the construction site ready for assembly—cut to the proper size with holes drilled in the ends for bolts. Numbers written on the steel indicate where a piece fits in the framework. Ironworkers unload and stack the steel so it can be hoisted easily when a piece is needed.

To hoist the steel, the ironworkers attach cables from the crane or derrick. One worker directs the hoisting equipment operator with hand signals. Another worker holds a rope attached to the piece of steel to prevent it from swinging on the hoisting cable.

The steel is hoisted to the desired position in the framework, where several workers are waiting. These workers may be high off the ground. As the steel on the hoisting cable is lowered, the workers position it with connecting bars, jacks, and handtools. Workers use driftpins or the handle of a spud wrench—a long wrench with a pointed handle—to align the holes in the piece of steel with the holes in the framework. Then they bolt the piece in place temporarily.

Before the steel piece can be permanently fixed to the framework, the workers must make sure it is vertically and horizontally straight. They check the alignment with plumb bobs and levels. When the piece is properly set, the workers bolt or weld it permanently in place.

Reinforced concrete—concrete containing steel bars or mesh—is an important material in buildings, bridges, and other structures. The steel gives the concrete additional strength. Ironworkers set the bars in the forms that hold concrete as it hardens, following blueprints that show the location, size, and number of reinforcing bars to be used in the structure. They fasten the bars together by wrapping wire around them with pliers. When reinforcing floors, workers place blocks or metal chairs under the reinforcing bars to hold them off the deck. These workers sometimes must cut the bars with acetylene torches, bend them if necessary, or weld bars together with arc-welding equipment. When concrete is reinforced with a coarse mesh made of welded wire, workers cut and fit the mesh before placing it in the area to be reinforced. While a concrete crew pours the slab, ironworkers use hooked rods to correctly position the wire mesh in the concrete mixture.

At construction sites, heavy structural steel and other large materials or equipment may have to be moved. Ironworkers assemble the rigging—cables, pulleys, and hooks—to move materials safely. They study the size, shape, and weight and select points of attachment that will provide a safe and secure hold on the load. Next, they hook or bolt one or more cables to both the hoisting equipment and the item to be moved. Workers then direct the load into position by giving hand signals and other directions to the hoisting machine operator.

Ironworkers also install metal stairways, catwalks, floor gratings, ladders, metal cabinets, and window frames, as well as lampposts, fences, and decorative ironwork. In addition, they bolt or weld prefabricated aluminum, brass, and bronze frames and panels to buildings.

Most ornamental metal is fabricated away from the construction site, so ironworkers spend most of their time fitting, aligning, and assembling. On the job, ironworkers make sure ornamental pieces fit correctly and hold firmly. They cut oversized pieces to size and sometimes drill holes. For secure connections, they bolt, braze, or weld the metals.

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Ironworkers position reinforcing bars that strengthen concrete components.

Working Conditions

Most ironworkers work outside a great deal of the time, in all kinds of weather. However, those who must work at great heights do not work when it is wet, slippery because of snow or ice, or extremely windy.

Ironworkers may be injured in falls. However, they use safety devices such as nets, safety belts, and scaffolding to reduce the risk of injuries.

Ironwork can involve considerable travel, because work available locally may be insufficient to keep crews employed.

Employment

Ironworkers held about 93,000 jobs in 1982, about 13,000 fewer jobs than in 1980. This decline reflects the severe dropoff in construction activity during the 1981-82 recession. Most of these workers are employed by general contractors, steel erection contractors, or ornamental iron fabricators. Some are employed by large steel companies or their subsidiaries engaged in the construction of bridges, dams, and large buildings. Some work for government agencies, public utilities, or large industrial firms that do their own construction work. Very few are self-employed.

Ironworkers are employed in all parts of the country, but most work in metropolitan areas where most commercial and industrial construction takes place.

Training, Other Qualifications, and Advancement

Most training authorities recommend the completion of an apprenticeship as the best way to learn this trade. However, a large number of ironworkers learn informally on the job.

Apprenticeship programs are administered by joint union-management committees made up of representatives of local unions of the International Association of Bridge, Structural and Ornamental Ironworkers and local chapters of contractors' associations. The apprenticeship consists of 3 years of on-the-job training and a minimum of 144 hours a year of classroom instruction.

In the classroom, apprentices study the basics of structural erecting, rigging, reinforcing, and ornamental assembling, as well as blueprint reading, the care and safe use of tools and materials, and mathematics for layout work. On the job, apprentices get experience in all aspects of the trade, such as unloading and storing materials at the job site, rigging materials for movement by crane or derrick, connecting structural steel, and welding.

Ironworkers who learn the trade informally generally do not receive classroom training, although some large contractors have extensive training programs. Nonapprentice trainees receive on-the-job training similar to the training of apprentices, but they are not guaranteed experience in all aspects of the trade.

Applicants for ironworker jobs generally must be at least 18 years old. A high school diploma may be preferred by employers and is required by most local apprenticeship committees. Courses in general mathematics, mechanical drawing, and shop provide a helpful background.

Because materials used in ironworking are heavy and bulky, ironworkers must be in good physical condition. Agility and balance also are required in order to work at great heights on narrow beams and girders.

Advancement opportunities for ironworkers are limited. Experienced ironworkers can become supervisors. Ironwork offers relatively few opportunities for self-employment because the work requires large expenditures for equipment.

Job Outlook

Employment of ironworkers is expected to increase faster than the average for all occupations through the mid-1990's to meet rising demand for nonresidential buildings, power transmission towers, and highway and bridge maintenance—types of construction that require extensive use of structural steel and reinforced concrete. Although many jobs will result from growth in demand for these workers, most openings will result from the need to replace experienced ironworkers who transfer to other fields of work, retire, or die.

The number of job openings will fluctuate from year to year as economic conditions change. Construction activity is sensitive to changes in the level of interest rates, the amount of business investment, and the level of government spending. When these conditions are unfavorable, the level of construction generally falls, reducing job openings for ironworkers.

Job opportunities for ironworkers also vary by geographic area. The level of construction activity reflects differences in local economic conditions. Therefore, the number of job opportunities in a given year may vary widely from area to area.

Job openings for ironworkers usually are more abundant during the spring and summer months when the level of construction activity increases.

Many people are attracted to ironworker apprenticeship programs by the high wages and the opportunity for all-round training, thereby causing stiff competition for available positions.

Earnings

Median weekly earnings for ironworkers were about $500 in 1982. About one-half had weekly earnings that ranged between $380 and $620.

Union wage rates in metropolitan areas for ironworkers were about $15.00 an hour in 1982, about twice the average wage of all nonsupervisory and production workers in private industry, except farming. Apprentices start at 60 to 70 percent of the hourly rate paid to experienced workers. During apprenticeship, they receive increases every 6 months. Annual earnings for ironworkers, however, are generally lower than hourly wages would indicate because the number of hours they work in a year can be affected by adverse weather and time off between jobs.

Many workers in this trade are members of the International Association of Bridge, Structural and Ornamental Iron Workers.

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Related Occupations

Ironworkers play an essential role in erecting buildings, bridges, powerlines, and other structures. Other occupations important in these types of construction are operating engineers, rough carpenters, and welder fitters.

Sources of Additional Information

For more information on apprenticeships or other work opportunities, contact local general contractors; a local of the International Association of Bridge, Structural and Ornamental Iron Workers; a local joint union-management apprenticeship committee; a local or State chapter of the Associated Builders and Contractors, or the nearest office of the State employment service or apprenticeship agency.

For general information about ironworkers, contact:

Associated General Contractors of America, Inc., 1957 E St. NW., Washington, D.C. 20006.

Painters and Paperhangers

(D.O.T. 749.684-046; 840.381-010, -014, -018, and .681-010; 841.381-010; and 845.681-010)

Nature of the Work

Paint and wall coverings make rooms more attractive and comfortable. In addition, paints and similar materials protect outside walls from wear caused by the weather. Although some people do both types of work, painting and paperhanging are separate skilled trades.

Painters apply paint, varnish, and other finishes to buildings and other structures. They prepare the surface to be covered so that the new paint will adhere properly. Sometimes it is necessary to remove the old coating before the new paint or coating is applied. Painters use several methods to remove old coatings including: Stripping with solvents, sanding, wire brushing, and water and sand blasting. Painters also wash walls and trim to remove dirt and grease, fill nail holes and cracks, sandpaper rough spots, and brush off dust. When painting new surfaces, they cover them with a primer or sealer to make a suitable surface for the finish coat.

Painters use brushes, rollers, and spray guns to apply paint thoroughly, uniformly, and rapidly to surfaces such as wood, concrete, metal, masonary, plastic, or drywall. Brushes of many sizes and shapes are used on a wide variety of surfaces. Rollers and spray guns are used on surfaces such as walls and ceilings, where they permit faster painting than brushes. Spray guns also are used on surfaces that are difficult to paint with a brush, such as cinder block and metal fencing.

Painters mix paints and match colors, using a knowledge of paint composition and color harmony. They also know the characteristics of common types of paints and finishes from the standpoints of durability, ease of handling, and application.

When working on tall buildings and similar structures, painters erect scaffolding, including "swing stages" (scaffolds suspended by ropes or cables attached to roof hooks). When painting steeples and similar conical structures, they use a "bosun chair" (a device somewhat like a swing).

Paperhangers cover walls and ceilings of rooms with decorative wall coverings made of fabric, vinyl, paper, or other materials. The first step in hanging wall coverings, as in painting, is to prepare the surface to be covered. To do this, paperhangers apply "sizing," a material that seals the surface and enables the covering to stick better. In redecorating, they may have to remove the old covering by wetting it with water-soaked sponges or by applying mild solvents. If there are many layers they may steam the old off the surface. Frequently, it is necessary for paperhangers to patch holes before hanging the new wall covering.

When the surface is prepared, paperhangers measure the area to be covered and cut the covering into strips of the proper size. While cutting the strips, paperhangers check the covering for flaws and closely examine the pattern, so it can be matched when the strips are hung.

Paperhangers prepare paste or other adhesives according to manufacturers' directions, and brush or roll the adhesive on the covering. When they place the cut strips on the wall or ceiling, paperhangers must make sure they are hung straight with the edges carefully butted together to make tight, closed seams. Using broad knives and brushes, paperhangers smooth the strips to make them stick and to remove air bubbles and wrinkles. They trim the excess covering from the top and bottom of each strip with a razor knife.

Working Conditions

Painters and paperhangers must stand for long periods. Their jobs also require a considerable amount of climbing and bending. These workers must have strong arms because much of the work is done with arms raised overhead. Painters and paperhangers risk injury from slips or falls off ladders and scaffolds. Painters often work outdoors.

Employment

Painters held 362,000 jobs in 1982; paperhangers held 19,000. Many worked for contractors engaged in new construction, repair, alteration, or remodeling work. Organizations that own or manage large buildings, such as hotels, offices, and apartment complexes, employ maintenance painters, as do schools, hospitals, and factories.

A high proportion of workers in these trades are in business for themselves. About 1 of every 2 painters and 2 of every 3 paperhangers are self-employed, compared to one-eighth of all building trades workers. In addition, a much larger proportion of painters than of other workers in the building trades work part time.

Training, Other Qualifications, and Advancement

Painting and paperhanging are learned through apprenticeship or informal, on-the-job instruction. Most training authorities recommend completion of a formal apprenticeship as the best way to become a painter or paperhanger, although many new workers begin as helpers to experienced painters. Few opportunities for informal training exist for paperhanger trainees because there are relatively few paperhangers, and most work alone.

The apprenticeship for painters and paperhangers consists of 3 years of on-the-job training, in addition to 144 hours of related classroom instruction each year. The apprenticeship agreement outlines the terms and conditions of training. Apprentices receive instruction in subjects such as color harmony, use of tools, surface preparation, application of coating, paint mixing and matching, care and use of tools and equipment, staining, glazing, gold leafing, blueprint reading, use of ladders and scaffolding, wood finishing, and safety. They also learn the relationship between painting and paperhanging and the work performed by the other building trades.

On-the-job instruction covers similar skills for apprentices and helpers. Under the direction of experienced workers, trainees carry supplies, erect scaffolds, and do other simple tasks while they learn about the different kinds of paint and painting equipment. Within a short time, trainees learn to prepare surfaces for painting and paperhanging, to mix paints, and to apply paint and wall coverings efficiently.

Painters use rollers to paint ceilings and walls.

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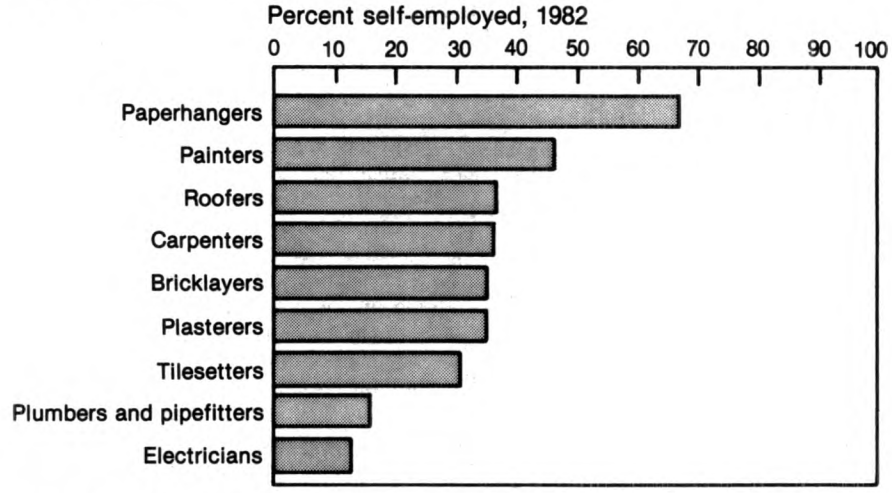
Paperhangers and painters have the highest proportions of self-employed of all construction craft occupations.



SOURCE: Bureau of Labor Statistics

Near the end of their training, they may learn decorating concepts, color coordination, and cost-estimating techniques.

Applicants for apprentice or helper jobs generally must be at least 16 years old and in good physical condition. A high school or vocational school education that includes courses in mathematics may be preferred by employers and local apprenticeship committees. Applicants should have manual dexterity and a good color sense.

Painters and paperhangers may advance to supervisory jobs with painting and decorating contractors. A sizable number establish their own painting and decorating businesses.

Job Outlook

Employment of both painters and paperhangers is expected to grow about as fast as the average for all occupations through the mid-1990's. Business growth will create a demand for new buildings and industrial structures. More painters will be needed to paint them and to repaint older buildings. The continued popularity of wallpaper and other wall coverings will increase the demand for paperhangers as the number of buildings continues to rise.

Replacement needs will account for most of the job openings for painters and paperhangers. Each year thousands of jobs will become available as painters transfer to other occupations, retire, die, or stop working for other reasons. Since there are no strict training requirements for entry, many people with limited skills work as painters for a short time and then leave the labor force or transfer to other types of work, thus creating many job openings. Because there are few paperhangers, the number of openings in that trade is relatively small.

Painters and paperhangers experience periods of unemployment because of the short duration of many construction projects and the cyclical nature of construction activity. However, remodeling and maintenance projects provide many jobs for painters and paperhangers even when overall construction activity declines. Painters and paperhangers can improve their chances of avoiding layoffs by learning to use a variety of tools, paints, and wall coverings because employers try to keep their most skilled workers even during business slumps.

People wishing to enter painting and paperhanging apprenticeships may face competition for positions. High wages and good training offered by these programs attract many people.

Earnings

Median weekly earnings for painters who were not self-employed were about $295 in 1982. Most earned between $215 and $370 weekly. The top 10 percent earned over $530 and the bottom 10 percent earned less than $160 a week.

The hourly rate for union painters and paperhangers in the construction industry was about $14.50 in 1982. The hourly rate for maintenance painters was about $10.75 in 1982. In comparison, the average rate for all nonsupervisory or production workers in private industry, except farming, was $7.67 an hour. Annual income for painters and paperhangers may not be as high as hourly rates would indicate because some worktime is lost due to bad weather and occasional unemployment.

Hourly wage rates for apprentices usually start at 50 percent of the rate paid to experienced workers and increase every 6 months until the full rate of pay is reached at the completion of apprenticeship.

A large proportion of painters and paperhangers are members of the International Brotherhood of Painters and Allied Trades. A few are members of other unions.

Related Occupations

Painters use paints, varnishes, and lacquers to decorate and protect wood, metal, and other surfaces. Other occupations in which workers apply paints and similar finishes include spray painters, shipyard painters, metal sprayers, undercoaters, and transportation equipment painters.

Paperhangers decorate walls with paper, vinyl, and fabrics; related occupations include stucco masons, plasterers, and cement masons.

Sources of Additional Information

For details about painting and paperhanging apprenticeships or other work opportunities in these trades, contact local painting and decorating contractors; a local of the International Brotherhood of Painters and Allied Trades; a local joint union-management apprenticeship committee; or the nearest office of the State apprenticeship agency or State employment service. To find out who administers the apprenticeship program in your area, contact:

International Brotherhood of Painters and Allied Trades, 1750 New York Ave. NW., Washington, D.C. 20006.

Painting and Decorating Contractors Association of America, 7223 Lee Hwy., Falls Church, Va. 22046.

For general information about the work of painters and paperhangers, contact:

National Joint Painting, Decorating, and Drywall Finishing Apprenticeship and Training Committee, 1750 New York Ave. NW., Lower Level, Washington, D.C. 20006.

Associated Builders and Contractors, 729 15th St. NW., Washington, D.C. 20005.

Plasterers

(D.O.T. 842.361-018, -022, and -026, and .381-014)

Nature of the Work

Plasterers finish interior walls and ceilings with many types of plaster materials that form fire-resistant and relatively soundproof surfaces, and they apply durable cement plasters, epoxy finishes, and stucco to exterior surfaces. They also cast ornamental designs in plaster.

To interior surfaces such as cinder block and gypsum lath, plasterers apply two coats of plaster. The first or brown coat is a brown mixture that provides a base; the second or finish coat (also called white coat) is a lime-based plaster. When the foundation consists of metal lath (a supportive wire mesh), plasterers first apply a preparatory or scratch coat to the lath, using either spray or a trowel (a flat, 4-inch by 10-inch metal plate with a handle), in wavelike motions to spread a rich plaster mixture into and over the metal lath. Before the plaster on the lath sets, workers scratch its surface with a tool similar to a rake, producing ridges so the brown coat will cling tightly.

For the brown coat—whether applied to a scratch coat, cinder block, or gypsum lath—laborers prepare a thick but smooth plaster. Plasterers then either spray or trowel this mixture onto the surface, and smooth the plaster to an even, level surface for finishing.

For the finish coat, plasterers prepare a mixture of lime, plaster of Paris, and water. They quickly apply it onto the brown coat using a

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hawk (a light, metal plate with handle), trowel, brush, and water. This mixture, which sets very quickly, produces a very smooth, durable finish.

Plasterers also work with a plaster material that can be finished in a single coat. Thin-coat or veneer plaster, made of lime and plaster of Paris and mixed with water on the job site, can be applied on interior masonry surfaces, specially manufactured wallboard, or drywall prepared with a bonding agent. Thin-coat plaster, applied like white coat, also provides a smooth, durable finish.

Plasterers create decorative surfaces as well. For example, while the final coat is still soft, they press a brush or trowel firmly against the surface and use a circular hand motion to create decorative swirls.

For exterior work, plasterers usually apply a mixture of white cement and sand—stucco—over cement, concrete, and masonry. Sometimes stucco is applied directly to a wire lath scratch coat. As an alternative, they embed marble or gravel chips into the finish coat to achieve a uniform, pebblelike, decorative finish.

Some plasterers apply insulation systems to the exteriors of new and old buildings. They cover the outer wall with insulation board and fiberglass cloth and then trowel on a scratch coat. They then apply an additional coat of plaster material, often with a decorative finish.

Plasterers sometimes do complex decorative and ornamental work that requires much more skill than other plastering and provides an opportunity for an individual to be creative. For example, they may mold intricate designs for the walls and ceilings of public buildings. To make these designs from an architect's blueprint, plasterers pour a special plaster into a mold and allow it to set. Workers then remove the molded plaster and cement it to the desired surface.

Working Conditions

Plasterers work outside when applying stucco but most jobs are indoors. Sometimes plasterers work on scaffolds high above the ground to finish walls and ceilings.

Plastering is physically demanding—requiring considerable standing, bending, lifting, and reaching overhead.

Employment

Plasterers held about 20,000 jobs in 1982. Most plasterers work on new construction and alteration jobs, particularly where special architectural and lighting effects are part of the work. Some repair and renovate older buildings. Many plasterers are employed in Florida, California, and the Southwest, where stucco work is very popular.

Most plasterers work for independent contractors. About 1 out of every 3 plasterers is self-employed.

Training, Other Qualification, and Advancement

Most training authorities recommend completion of an apprenticeship as the best way to learn plastering. However, most people learn the trade by working as helpers, observing and learning from experienced plasterers.

Apprenticeship programs, sponsored by local joint committees of contractors and unions, generally consist of at least 2 years of on-the-job training, in addition to at least 144 hours annually of classroom instruction in drafting, blueprint reading, and mathematics for layout work. Nonunion contractors often conduct similar programs for trainees.

In class, apprentices start with a history of the trade and the industry. They also learn about the uses of plaster, costs, and many other subjects. On the job, they learn about lath bases, plaster mixes, methods of plastering, blueprint reading, and safety. Experienced plasterers direct and help apprentices. Some apprenticeship programs allow individuals to obtain training in related occupations such as cement masonry and bricklaying.

Those who learn the trade informally as helpers usually start by carrying materials, setting up scaffolds, and mixing plaster. In a short time, they learn to apply the scratch and brown coats. Learning to apply the finish coat takes considerably longer.

Applicants for apprentice or helper jobs generally must be at least 17 years old, be in good physical condition, and have manual dexterity. Applicants who have a high school or vocational school education are preferred. Courses in general mathematics, mechanical drawing, and shop provide a useful background.

Plasterers may advance to supervisors, superintendents, or estimators for plastering contractors, or may become self-employed, contracting for small plastering jobs.

Job Outlook

Employment of plasterers is expected to increase more slowly than the average for all occupations through the mid-1990's. Most job openings will result from the need to replace workers who transfer to other occupations, retire, or die. Throughout much of the 1960's and early 1970's, employment of plasterers declined steadily as more builders switched to drywall construction, which saves both time and money. This decline has halted in recent years, however, and employment of plasterers may rebound somewhat as a result of increased emphasis on durability and hardness that trowelled finishes provide. Thin-coat plastering, in particular, is expected to gain greater acceptance as more builders and developers recognize its ease of application, durability, and quality of finish. In addition, plasterers will be needed to renovate plaster work in older structures and create special architectural shapes such as curved surfaces, which are not practical for drywall materials.

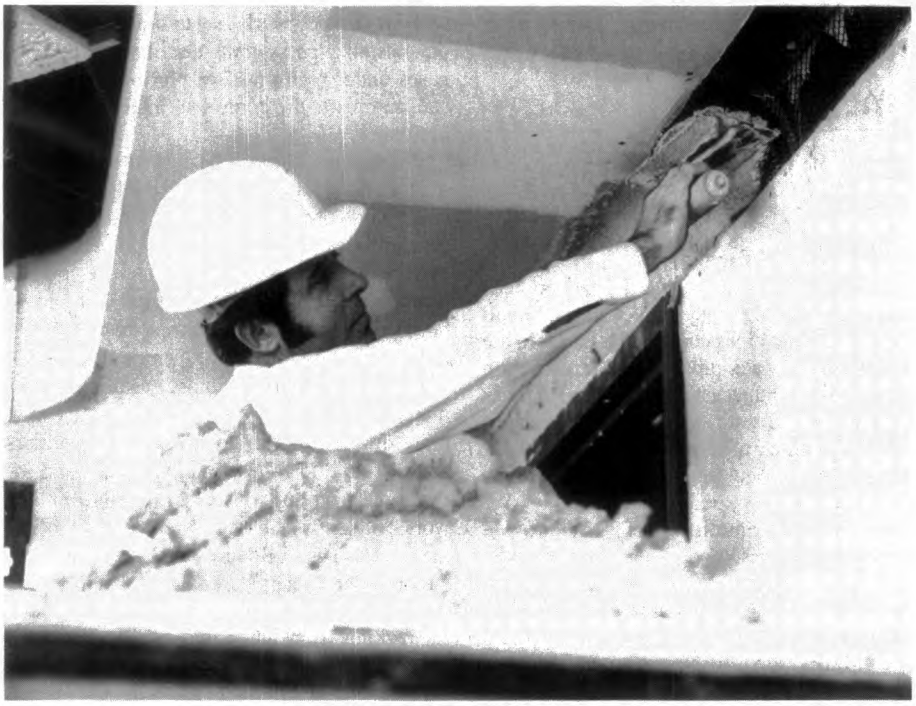
Because most plasterers work in construction, employment prospects may fluctuate from year to year due to changing economic conditions. High interest rates, which generally discourage building activity, may result in experienced plasterers as well as apprentices and helpers being laid off or having limited job openings.

Adverse weather conditions affect plastering less than other construction trades because much of this work is indoors. When applying finishes to exterior surfaces, however, plasterers may lose worktime because some materials cannot be applied under wet or freezing conditions.

Earnings

Median weekly earnings for plasterers were about $310 in 1982. About one-half had earnings between $220 and $445 a week. Self-employed plasterers may earn considerably more.

Union wages for plasterers in metropolitan areas averaged an estimated $14.05 an hour in



Plaster provides a very hard, durable finish that lasts for many years.

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1982, or nearly twice the average wage of all nonsupervisory workers in private industry, except farming. Nonunion workers and workers in small cities and rural communities generally earn less. Apprentice wage rates start at about half the rate paid to experienced plasterers and increase 10 percent every 6 months. However, yearly earnings for plasterers and apprentices are generally lower than hourly rates would indicate because poor weather and fluctuations in construction can adversely affect the annual number of hours they work.

A large proportion of plasterers are members of unions. They are represented by either the Operative Plasterers' and Cement Masons' International Association of the United States and Canada, or the International Union of Bricklayers and Allied Craftsmen.

Related Occupations

Other construction occupations in which workers use a trowel as the primary tool include cement masons, bricklayers, stonemasons, and tilesetters.

Sources of Additional Information

For information about apprenticeships or other work opportunities, contact local plastering contractors; locals of the unions previously mentioned; a local joint union-management apprenticeship committee; or the nearest office of the State apprenticeship agency or the State employment service.

For general information about the work of plasterers, contact:

International Union of Bricklayers and Allied Craftsmen, 815 15th St. NW., Washington, D.C. 20005.

Operative Plasterers' and Cement Masons' International Association of the United States and Canada, 1125 17th St. NW., Washington, D.C. 20036.

Plumbers and Pipefitters

(D.O.T. 862.261-010, .281-010 and -014, .361-014 and -018, and .381-014, -018, -022, -026, -030, and -034, .681-010, .682-010, and .684-034)

Nature of the Work

By simply turning on a faucet, a person activates a long, complex system of pipes. Small copper or plastic pipes connect the faucet to the building's main water pipes. These pipes in turn are connected to the cast iron or concrete pipes of the municipal water system that run underground for miles to a water treatment plant. Larger pipes connect the plant to a river, reservoir, or other water source.

Other pipe systems dispose of waste, provide water to fight fires, and transport water and steam for cooling and heating. Pipe systems in powerplants play an essential role in producing electricity by carrying the steam that powers huge turbines. Pipes also are used in manufacturing plants to move material through the production process.

Plumbers must make sure their work meets local building codes.

Plumbers and pipefitters install and maintain all these vitally important pipe systems. Although plumbing and pipefitting are sometimes considered a single trade, workers may specialize in either craft. Plumbers build and repair the water, waste disposal, drainage, and gas systems in homes and commercial and industrial buildings. They also install plumbing fixtures—bathtubs, sinks, and toilets—and appliances such as dishwashers. Pipefitters build and repair both high and low pressure pipe used in heating, ventilating, and air-conditioning of buildings, manufacturing, generation of electricity, and transportation. They may specialize further, according to the type of pipe system with which they work. Steamfitters, for example, install pipe systems that move liquids or gases under high pressure. Sprinklerfitters install automatic fire control sprinkler systems in buildings.

Because the purpose, size, and operation of pipe systems differ, the materials and construction techniques used by plumbers and pipefitters vary by construction project. Water systems in homes, for example, use copper, plastic, and galvanized steel pipe that can be handled and installed by one or two workers. Municipal sewage systems, on the other hand, are made of large clay pipe. Installation normally requires crews of pipefitters. Despite these differences, all plumbers and pipefitters must be able to follow building plans and instructions from supervisors, lay out the job, and work efficiently with the materials and tools of the trade. The following example illustrates how plumbers use these skills to install piping in a house.

Working from blueprints or shop drawings that show the planned location of pipes, plumbing fixtures, and appliances, plumbers lay out the job to fit the piping into the structure of the house with the least waste of material and without damaging the structure. They measure and mark areas where pipe will be installed and connected. They also check for obstructions, such as electrical wiring, and plan how to install pipe around the problem.

To install the piping, plumbers may saw holes in walls, ceilings, and floor. They may hang steel supports from ceilings that will hold the pipe in place. To assemble the system, plumbers cut and bend lengths of pipe using saws, pipe cutters, and pipe bending machines. They connect lengths of pipe with fittings; the method depends on the type of pipe used. For copper pipe, plumbers slide fittings over the end of the pipe and solder the fitting in place with a torch. For steel pipe, plumbers thread the end with a pipe threading machine and screw the pipe into the fitting.

When the piping is in place, plumbers install the fixtures and appliances and connect the system to the outside water and sewer lines. Using pressure gauges, they check the system to insure that the plumbing works properly.

Working Conditions

Plumbing and pipefitting work is demanding. Workers do a lot of heavy lifting and must stand for long periods. Plumbers and pipefitters work both indoors and outside in all types of weather. They often work in cramped and dirty places. They can be injured by falls from ladders, cuts from sharp tools, and burns from hot pipes.

Employment

Plumbers and pipefitters held 388,000 jobs in 1982, nearly 9,000 fewer than in 1982. This decline reflects the severe dropoff in construction activity during the 1981-82 recession. Most worked for mechanical and plumbing contractors engaged in new construction or repair, alteration, or modernization work. About

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1 out of 6 plumbers and pipefitters is self-employed. Some plumbers install and maintain pipe systems for government agencies and public utilities, and some work on the construction of ships and aircraft. Others do maintenance work in industrial and commercial buildings. Pipefitters, in particular, are employed as maintenance personnel in the petroleum, chemical, and food-processing industries where manufacturing operations require the moving of liquids and gases through pipes.

Training, Other Qualifications, and Advancement

Apprenticeship is the best way for plumbers or pipefitters to learn all aspects of these trades. A large number of people, however, learn plumbing and pipefitting by working for several years as helpers to experienced plumbers and pipefitters.

Apprenticeship programs for plumbers and pipefitters are administered by local union-management committees comprised of members of the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry and the Mechanical Contractors Association of America, Inc. or the National Association of Plumbing-Heating-Cooling Contractors. Apprenticeship programs also are administered by local chapters of the Associated Builders and Contractors and the National Association of Plumbing-Heating-Cooling Contractors. Apprenticeships consist of 4 years of on-the-job training, in addition to at least 216 hours annually of related classroom instruction. Classroom subjects include drafting and blueprint reading, mathematics, applied physics and chemistry, safety, and local plumbing codes and regulations.

On the job, apprentices first learn basic skills such as identifying grades and types of pipe, the use of the tools of the trade, and the safe unloading of materials. As apprentices gain experience, they learn how to work with various types of pipe and to install different piping systems and plumbing fixtures.

People learning the trade as helpers acquire their skills by observing and assisting experienced plumbers and pipefitters. These workers may not learn to work with as wide a variety of materials and piping systems as apprentices.

Applicants for apprentice or helper jobs generally must be at least 18 years old and in good physical condition. Employers prefer high school graduates. Courses in shop, plumbing, general mathematics, drafting, blueprint reading, and physics are helpful. Applicants may be given tests to determine whether they have the mechanical aptitude required in these trades.

Most communities require plumbers to be licensed. To obtain a license, workers must pass a special examination to demonstrate knowledge of the trade and of local plumbing codes.

Some plumbers and pipefitters may become supervisors for mechanical and plumbing contractors. Others go into business for themselves. As they expand their activities, they may employ other workers and become contractors.

Job Outlook

Employment of plumbers and pipefitters is expected to grow faster than the average for all occupations through the mid-1990's. Some of this growth represents a rebounding of employment to prerecession levels. Over the long run construction and renovation of oil refineries, chemical plants, powerplants, pipelines, office buildings, factories, and other projects that have large, complex pipe systems are expected to spur the demand for pipefitters. Residential construction also is expected to increase the demand for plumbers.

In addition to jobs created by increased demand for plumbers and pipefitters, many openings will occur each year from the need to replace experienced workers who retire, die, or stop working for other reasons. Relatively few plumbers and pipefitters transfer to other occupations, reflecting their lengthy investment in training. Nevertheless, most job openings will stem from replacement needs.

Because of the temporary nature of construction projects, plumbers and pipefitters may become unemployed for short periods when the project on which they are working ends. Some plumbers and pipefitters may face longer periods of unemployment when overall construction activity declines and fewer jobs are available. Employment of these workers, however, generally is less sensitive to changes in economic conditions than many other construction trades. Maintenance of existing piping systems provides jobs for many plumbers and pipefitters even when construction activity declines.

People wishing to enter plumbing and pipefitting apprenticeships are likely to face competition. High wages and opportunities for all-round training attract many people to these programs.

Earnings

Median weekly earnings for plumbers and pipefitters who are not self-employed were $420 in 1982. Most earned between $310 and $560 weekly. The lowest 10 percent earned less than $230; the highest 10 percent earned over $670.

Hourly wage rates for union plumbers and pipefitters in construction in 1982 were about $15.50. Maintenance pipefitters averaged $12.30 an hour in metropolitan areas. In comparison, the average wage for all nonsupervisory and production workers in private industry, except farming, was $7.67. Apprentice wage rates start at 40 to 50 percent of the rate paid to experienced plumbers or pipefitters and increase every 6 months.

Many plumbers and pipefitters are members of the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada. Some plumbers and pipefitters who have become contractors are members of the Associated Builders and Contractors, the Mechanical Contractors Association of America and the National Association of Plumbing-Heating-Cooling Contractors.

Related Occupations

Other occupations in which workers install and repair mechanical systems in buildings are boilermakers, electricians, elevator constructors, environmental control system installers and servicers, hot air furnace installers and repairers, millwrights, oil burner servicers and installers, and sheet-metal workers.

Sources of Additional Information

For information about apprenticeships or work opportunities in plumbing and pipefitting, contact local plumbing, heating, and air-conditioning contractors; a local chapter of the Mechanical Contractors Association; a local of the union mentioned above; a local joint union-management apprenticeship committee; or the nearest office of the State employment service or State apprenticeship agency.

For general information about the work of plumbers, pipefitters, and sprinklerfitters, contact:

National Association of Plumbing-Heating-Cooling Contractors, 1016 20th St. NW., Washington, D.C. 20036.

Associated Builders and Contractors, 729 15th St. NW., Washington, D.C. 20005.

National Fire Sprinkler Association, P.O. Box 1000, Patterson, N.Y. 12563.

Mechanical Contractors Association of America, 5530 Wisconsin Ave., Suite 750, Washington, D.C. 20015.

Roofers

(D.O.T. 866.381-010, -014, and .684-010)

Nature of the Work

A leaky roof can damage ceilings, walls, and furnishings. To keep out water, roofers install and repair various kinds of materials such as tar and gravel, rubber, slate, asphalt or fiberglass shingles, and tiles. Reroofing—installing new roofs on existing buildings—accounts for about 70 percent of all roofing work. Roofers also may waterproof foundation walls and floors.

There are two types of roofs, flat and pitched (slanted). Most commercial and industrial buildings have flat roofs. Most houses have pitched roofs. Roofers may work with both types, although many roofing contractors specialize in residential installation and repair. A roofer's work varies with the type of roof and roofing involved.

Most flat roofs are covered with several layers of materials. Roofers first put a layer of insulation on the roof deck. They then spread a coat of hot bitumen (a tar-like substance) over the roof's insulation. Next, they lay roofing felt (fabric saturated in bitumen) over the entire surface. Roofers then use a mop to spread hot bitumen over and under the felt. This seals the seams and makes the surface watertight. Roofers repeat these steps to build up the desired number of layers (called plies), ending with a thick layer of bitumen over the surface. The top layer is sometimes glazed to make a smooth

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finished coat or gravel is embedded while it is still hot.

Some flat roofs are covered with a single ply system often made of waterproof rubber. Roofers roll the rubber over the roof's insulation, and seal the seams. They cement it with an adhesive and hold it in place with blocks or stone until it dries.

Most house roofs are covered with shingles made of asphalt, fiberglass, tile, slate, or wood. When applying these shingles, roofers first lay, cut, and tack 3-foot strips of roofing felt lengthwise over the entire roof. Then, starting from the bottom edge, they nail overlapping rows of shingles to the roof. Workers measure and cut the felt and shingles to fit intersecting roofs, and to fit around vent pipes and chimneys. Wherever two roof surfaces intersect or shingles reach a vent pipe or chimney, roofers cement or nail flashing (strips of metal or shingle) over the joints to make them watertight. Applying flashing around chimneys is particularly difficult and requires special knowledge and skill. Finally, roofers cover exposed nailheads with cement to prevent rust and water leakage.

Some roofers also waterproof and dampproof masonry and concrete walls and floors. To prepare surfaces for waterproofing, they hammer and chisel away rough spots or remove them with a rubbing brick before brushing on a coat of liquid waterproofing compound. They also may paint or spray surfaces with a waterproofing material or nail waterproofing fabric to surfaces. When dampproofing, they usually spray a coating of tar on interior or exterior surfaces.

Working Conditions

Roofers' work is strenuous. It involves heavy lifting, as well as climbing, bending, and squatting. Roofers risk injuries from slips or falls from scaffolds, ladders, or roofs, and burns from hot bitumen. In fact, the accident rate in the roofing industry generally is the highest in all construction. Roofers work outdoors in all types of weather, particularly when making repairs. Roofs are extremely hot during the summer.

Employment

Roofers held about 102,000 jobs in 1982, nearly 8,000 fewer than in 1980. This decline reflects the severe dropoff in construction activity during the 1981-82 recession. Most roofers work for roofing contractors on construction or repair jobs. Some work for businesses and government agencies that do their own construction and repair work. About 3 out of every 10 roofers are self-employed.

Training, Other Qualifications, and Advancement

The majority of roofers acquire their skills informally by working as helpers for experienced roofers. They start by carrying equipment and material and erecting scaffolds and hoists. Within 2 or 3 months they are taught to measure, cut, and fit roofing materials. Soon, they are able to lay asphalt or fiberglass shingles. It can take 5 years or more to get experience installing all types of roofing materials, because some materials are not used frequently.

Some roofers train through 3-year apprenticeship programs administered by local union-management committees. The apprenticeship program generally consists of a minimum of 1,400 hours of on-the-job training annually, in addition to 144 hours of classroom instruction in subjects such as tools and their use, arithmetic, and safety. On-the-job training for apprentices is similar to that for helpers, except that the apprenticeship program is more structured. Apprentices also learn to dampproof and waterproof walls.

Good physical condition and a good sense of balance are essential. A high school education or its equivalent is helpful, as are courses in mechanical drawing and basic mathematics. Applicants for apprenticeship programs must be at least 18 years old.

Roofers may advance to supervisor for a roofing contractor; some become contractors themselves.

Job Outlook

Employment of roofers is expected to increase as fast as the average for all occupations through the mid-1990's. Part of this projected growth reflects the rebound in employment to prerecession levels. Because turnover is high, the need to replace experienced roofers who leave the occupation will account for most job openings. Jobs should be easiest to find during spring and summer when most roofing is done.

Buildings need new roofs about every 10 to 20 years depending upon the type of the roofing material and the area of the country. Some roofing materials, such as slate, tile, or cedar, will last for 50 years or more with proper care. As the number of buildings in use grows, more roofers will be needed to do the additional reroofing work.

Roofing is less sensitive to general economic conditions than other construction occupations. Because reroofing accounts for most of the roofer's work, employment opportunities are not tied to the level of new construction, which tends to fall during economic downturns.

Earnings

Median weekly earnings for roofers working full time were about $310 a week in 1982. One out of 2 roofers earned between $215 and $455 a week and 1 out of 10 earned more than $600 weekly.

Union roofers in metropolitan areas had estimated average wages of about $14.15 an hour in 1982, according to the limited information available. In comparison, the average hourly rate for all nonsupervisory or production workers in private industry, except farming, was $7.67. Apprentices usually start at 55 percent of the skilled roofer's pay rate and receive increases every 6 months. Yearly earnings for roofers and apprentices, however, generally are lower than hourly rates would indicate because the annual number of hours they work can be adversely affected by poor weather and fluctuations in construction.

Some roofers are members of the United Union of Roofers, Waterproofers and Allied Workers.

Related Occupations

Roofers cover and waterproof roofs using different types of shingles, bitumen and gravel, or other materials. Workers in other occupations also cover surfaces with special materials for protection and decoration. These occupations include acoustical carpenters, composition-weatherboard appliers, dry-wall applicators and tapers, floor covering installers, glaziers, siding applicators, terrazzo workers, and tilesetters.

Sources of Additional Information

For information about roofing apprenticeships or work opportunities in this trade, contact local roofing contractors; a local of the union

Roofers put down felt paper before attaching the roofing shingles.

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previously mentioned; a local joint union-management apprenticeship committee; or the nearest office of the State employment service or State apprenticeship agency.

For information about the work of roofers, contact:

National Roofing Contractors Association, 8600 Bryn Mawr Ave., Chicago, Ill. 60631.

Sheet-Metal Workers

(D.O.T. 804.281-010, -014, and 809.381-014)

Nature of the Work

Sheet-metal workers make, install, and maintain a variety of sheet-metal products for homes and commercial and industrial buildings. These products include ducts for air-conditioning, heating, and ventilating and pollution control systems, kitchen equipment, roofs, siding, rain gutters, skylights, and outdoor signs. Some workers specialize in fabrication, installation, or maintenance; but most do all three jobs. (This statement covers only sheet-metal workers employed in the construction industry. It does not include those employed in the mass production of sheet-metal products.)

Sheet-metal workers usually fabricate their products at a shop away from the construction site. Working from blueprints or instructions from supervisors, they measure, cut, bend, shape, and fasten pieces of sheet metal to make duct work, counter tops, and other custom products. Workers use tapes and rulers for measuring sheet metal and laying out the work; hand shears, hack saws, and power saws for cutting; and specially designed, heavy steel presses and shears for cutting, bending, and shaping. In some shops, workers use computerized equipment to lay out and cut the sheet metal. After it has been cut and shaped sheet metal workers fasten the seams and joints together with bolts, cement, drive slips, rivets, solder, or by welding.

Most sheet-metal workers learn their trade through apprenticeship.

At the construction site, sheet-metal workers assemble and install pieces fabricated at the shop. They also use hammers, shears, and drills to make parts by hand at the worksite and to alter parts made in the shop.

Workers install ducts, pipes, and tubes by joining them end to end and hanging them with metal hangers secured to a ceiling or a wall. To hold the pieces together, workers may bolt, weld, rivet, glue, or solder, or use specially formed sheet metal drive slips.

Molded and pressed sheet metal, such as roofing and siding, usually is measured and cut on the job. After securing the first panel in place, workers interlock and fasten the grooved edge of the next panel into the grooved edge of the first. They nail or weld the free edge of the panel to the structure. This two-step process is repeated for each additional panel. Finally, at joints, along corners, and around windows and doors, workers fasten machine-made molding for a neat, finished effect.

Some sheet-metal workers specialize in testing, balancing, adjusting and servicing of existing air-conditioning and ventilation systems to make sure they are functioning properly.

Working Conditions

Sheet-metal workers do considerable bending, lifting, standing, and squatting in close quarters or in awkward positions. They often work high above ground. They may get cuts and burns from materials and tools. Because most work is done indoors, sheet-metal workers generally lose less work time than other construction workers due to bad weather.

Employment

Sheet-metal workers held about 87,000 wage and salary jobs in the construction industry in 1982—nearly 12,000 less than in 1980. This decline reflects the severe dropoff in construction activity during the 1981-82 recession.

Construction employers include roofing, sheet-metal, and air-conditioning and heating contractors and general contractors engaged in residential, industrial, and commercial building. Very few sheet-metal workers are self-employed. Sheet-metal workers are employed throughout the country, but jobs are concentrated in metropolitan areas.

Training, Other Qualifications, and Advancement

Unlike many other construction workers, the vast majority of sheet-metal workers learn their trade through apprenticeship. Only a very small proportion acquire their skills informally on the job.

The apprenticeship program usually consists of 4 years of on-the-job training and related classroom instruction. The programs are administered by joint committees of locals of the Sheet Metal Workers' International Association and local chapters of the Sheet Metal and Air-Conditioning Contractors' Association, or by local chapters of the Associated Builders and Contractors. The apprenticeship agreement usually provides a worker on-the-job experience in most aspects of the trade. Apprenticeship also is the best way to learn the mathematics needed for layout work.

On the job, apprentices use the tools, machines, equipment, and materials of the trade. They learn to measure, cut, bend, fabricate, and install sheet metal. They begin with duct work and gradually advance to more difficult jobs, such as making complex ducts, fittings, and decorative pieces. Toward the end of their training, they use materials such as pressed fiberglass, plastics, and acoustical tile, which may be substituted for metal on some jobs.

In the classroom, apprentices learn drafting, blueprint reading, trigonometry and geometry applicable to layout work, welding, and the principles of heating, air-conditioning, and ventilating systems. Safety is stressed throughout the program. In addition, apprentices learn the relationship between sheet-metal work and other construction work.

Workers who pick up the trade informally usually begin by carrying metal and cleaning up debris in a metal shop while they learn about materials and tools and their uses. Then, as employers permit, helpers learn to set switches and operate levers on machines that bend or cut metal. In time, helpers go out on the a to learn installation.

Applicants for jobs as apprentices or helpers should be in good physical condition and have mechanical aptitude. Local apprenticeship committees and employers may require a high school or vocational school education. Courses in trigonometry, geometry, mechanical drawing, and shop provide a helpful background for learning the trade.

Sheet-metal workers may advance to supervisory jobs or may go into the contracting business. Because a sheet-metal contractor must have a shop with equipment to fabricate products, this type of contracting business is more expensive to start than other types of construction contracting.

Job Outlook

Employment of sheet-metal workers in construction is expected to increase faster than the average for all occupations through the mid-1990's. Some of this growth reflects a rebounding of employment to prerecession levels. Most openings will arise as experienced workers leave the occupation, retire, or die. Relatively few sheet-metal workers transfer to another occupation, reflecting the lengthy apprenticeship most workers have completed.

More sheet-metal workers will be needed to install air-conditioning and heating duct work and other sheet-metal products in new houses, stores, offices, and other buildings. A growing demand for new, more energy-efficient air-conditioning and heating systems in existing buildings also will boost employment opportunities for sheet-metal workers. Installation of solar heating equipment will provide additional demand.

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Although employment of sheet-metal workers is expected to increase over the long run, workers may experience periods of unemployment when construction projects end and when economic conditions reduce the amount of construction. However, employment of sheet-metal workers is less sensitive to declines in new construction than employment of some construction workers, such as carpenters. Maintenance of existing sheet-metal equipment—which is less affected by economic fluctuations than new construction—makes up a large part of the work done by sheet-metal workers. Installations of new air-conditioning and heating systems in existing buildings also continue during construction slumps as individuals and businesses seek more energy-efficient equipment to cut utility bills.

People wishing to enter sheet-metal apprenticeships will face keen competition for positions because high wages and good training attract many people.

Earnings

Median weekly earnings of full-time sheet-metal workers were about $400 in 1982. Most earned from $320 to $510 weekly. The top 10 percent earned more than $640 a week while the bottom 10 percent earned less than $240 a week.

The average hourly rate for union sheet-metal workers in large metropolitan areas were about $15.00 in 1982. This was about twice the average for all nonsupervisory workers in private industry, except farming. In some areas union sheet-metal workers receive financial aid when they are unemployed. Hourly earnings for maintenance sheet-metal workers in metropolitan areas ranged from $10.14 to $14.27. Apprentices generally start at 40 percent of the rate paid to experienced sheet-metal workers and usually earn pay raises every 6 months during their apprenticeship.

A large proportion of sheet-metal workers are members of the Sheet Metal Workers' International Association.

Related Occupations

Other occupations in which workers lay out and fabricate metal products include bench die makers, layout workers, machinists, metal fabricators, metal patternmakers, shipfitters, and tool-and-die makers.

Sources of Additional Information

For more information about apprenticeships or other work opportunities, contact local sheet-metal contractors or heating, refrigeration, and air-conditioning contractors; a local of the union mentioned above; a local joint union-management apprenticeship committee; or the nearest office of the State employment service or apprenticeship agency.

For general information about sheet-metal workers, contact:

Associated Builders and Contractors, 729 15th St. NW., Washington, D.C. 20005.

Tilesetters

(D.O.T. 861.381-054, -058, and .684-018)

Nature of the Work

In ancient Egypt and Rome, tile was used for the design and construction of mosaics—an art form using small, decorative ceramic squares. Today, in a fashion similar to that of the ancient artists, tilesetters apply tile to floors, walls, and ceilings.

To set tile, which generally ranges in size from 1/2 inch to 6 inches square, workers use either cement or mastic (a very sticky paste). When using cement or mortar to set tile, tilesetters first must tack a support of metal mesh to the wall or ceiling. They use a trowel to apply a cement plaster, called a scratch coat, onto the metal screen and a tool, similar to a rake, to scratch the surface of the soft plaster. After the scratch coat has dried, tilesetters apply a rich coat of cement to the back of the tile and then place it onto the surface to be tiled.

To set tile in mastic or a cement adhesive (called "thin set"), tilesetters need a flat, solid surface such as drywall, concrete, plaster, or wood. They use a tooth-edged trowel to spread the mastic on the surface or apply the cement adhesive to the back of the tile. When properly positioned by the tilesetter, the tiles readily adhere to the surface without slippage.

Since tile varies in color, shape, and size, workers sometimes prearrange tiles on a dry floor according to a specified design. This allows workers to examine the pattern and make any necessary changes.

Whether or not tiles are prearranged, tilesetters place each tile onto the cement or mastic. Some tiles are cut with a machine saw or a special cutting tool to fit into corners and around pipes, tubs, and wash basins. Once the tile is placed, tilesetters gently tap the surface with their trowel handle or a small block of wood so the tiles seat evenly.

When the cement or mastic has set, tilesetters use a rubber float to fill the joints with grout—a very fine cement. They then scrape the surface with a rubber-edged device called a squeegee to further dress the joints and to remove excess grout from the face of the tile. Before the grout sets, tilesetters finish the joints with a damp sponge for a uniform appearance.

Working Conditions

Tilesetters generally work indoors and are not exposed to the weather. Since most of the structure has been completed, the work area is relatively clean and uncluttered. Much of the workday is spent bending, kneeling, and reaching, activities that require endurance but not exceptional strength. To protect their knees, some workers wear kneepads.

Although workers are subject to cuts from tools or materials, falls from ladders, and strained muscles, the occupation is not considered as hazardous as some other construction occupations.

Employment

Tilesetters held about 20,000 jobs in 1982, mainly in nonresidential construction, such as schools, hospitals, and public and commercial buildings. About 1 out of 3 tilesetters is self-employed.

Tilesetters are employed throughout the country but are found largely in urban areas.

Training, Other Qualifications, and Advancement

Most training authorities recommend completion of a 3-year apprenticeship program, which generally consists of on-the-job training and related classroom instruction in subjects such as blueprint reading, layout, and basic mathematics.

Apprentices begin by familiarizing themselves with the tools of the trade. They are taught to mix and apply cement and to apply mastic. Then, they learn to cut and install tile, and to apply grout and finishing techniques.

A substantial proportion of tilesetters, however, acquire skills informally by working as helpers to experienced workers. They start by carrying supplies, cleaning work areas, and grouting and cleaning tile. Depending on the employer, a helper may learn to spread cement or mastic. Eventually, a helper is taught to cut and set tile.

When hiring apprentices or helpers, employers usually prefer high school or vocational school graduates who have had courses in general mathematics, mechanical drawing, and shop. Good physical condition, manual dexterity, and a good sense of color harmony also are important assets. Apprenticeship programs, while often recommended, may be more difficult to enter than other forms of training. In some localities, a written test and a physical examination are required.

Tilesetters need physical endurance because much of the work involves kneeling, bending, and reaching.

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Skilled tilesetters may become supervisors or start their own contracting businesses.

Job Outlook

Employment of tilesetters is expected to increase faster than the average for all occupations through the mid-1990's. Although growth in demand for these workers will provide some new job opportunities, most will result from the need to replace tilesetters who retire, die, or leave the occupation for other reasons. Because tilesetting is a small occupation, however, there will be relatively few job openings annually.

Population and business growth are expected to cause an increase in the construction of houses and other buildings, and thus increase the demand for tilesetters. Continued preference for tile in kitchens and bathrooms and an expected increase in the use of tile in other areas of homes and other buildings will spur employment in this trade. Tile floors are increasingly being used in foyers, entranceways, and common areas of many office and commercial buildings. For example, tile is widely used in restaurants because of its durability and low maintenance costs.

Employment of tilesetters, like that of many construction occupations, is sensitive to changes in the economy, particularly changes in the level of housing and commercial construction. Workers in this trade can experience periods of unemployment, particularly when construction activity is down. On the other hand, temporary shortages of tilesetters may occur in some areas during peak periods of building activity.

Earnings

Median weekly earnings for tilesetters were nearly $390 in 1982. Earnings for the middle 50 percent ranged between $215 and $500 weekly. Union wage rates in metropolitan areas were $14.35 an hour, compared with an average hourly rate of $7.67 for all nonsupervisory and production workers in private industry, except farming. Hourly wage rates for apprentices start at about 50 to 60 percent of the rate paid to experienced workers and increase periodically.

The principal union organizing workers in this trade is the International Union of Bricklayers and Allied Craftsmen. In addition, the Tile, Marble, Terrazzo Finishers, Shopworkers, and Granite Cutters International Union organizes the helpers associated with tilesetters.

Related Occupations

Tilesetters use their knowledge of tools and materials along with skill and dexterity to produce attractive, durable surfaces. Other workers requiring similar abilities include bricklayers, cement masons, marblesetters, plasterers, stonemasons, and terrazzo workers.

Sources of Additional Information

For details about apprenticeship or other work opportunities in this trade, contact local tilesetting contractors; locals of the unions previously mentioned; or the nearest office of the State employment service or State apprenticeship agency.

For general information about the work of tilesetters, contact:

International Union of Bricklayers and Allied Craftsmen, International Masonry Institute Apprenticeship and Training, 815 15th St. NW., Washington, D.C. 20005.

Tile, Marble, Terrazzo Finishers, Shopworkers, and Granite Cutters International Union, Suite 116, 801 N. Pitt St., Alexandria, Va. 22314.

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Extractive Occupations

The mining and petroleum drilling industries provide most of our Nation's fuels and raw materials. Oil and gas drilling supply fuel for transportation, manufacturing, and home heating. Metallic mining produces iron, copper, and silver for manufacturing. Quarrying furnishes limestone and gravel for building. And coal mining provides fuel for generating electricity. The workers who drill for oil and gas, and mine coal, and metallic and nonmetallic ores make up the extractive occupations.

Workers in extractive occupations usually learn their skills on the job. New workers are hired from the area around the wells and mines. Physical strength, stamina, and mechanical aptitude often are the most important traits sought by employers. A high school diploma generally is not required.

After receiving safety training, new workers are assigned to laborer jobs around the well or mine. Opportunities for training and promotion usually are based on seniority and ability to do higher level work. In many cases, union-management agreements set the rules governing training and promotion. Workers learn by doing the job under the supervision of experienced workers.

Advancement opportunities for extractive workers are limited. Some workers become supervisors; however, additional education is needed to advance to higher supervisory or management jobs.

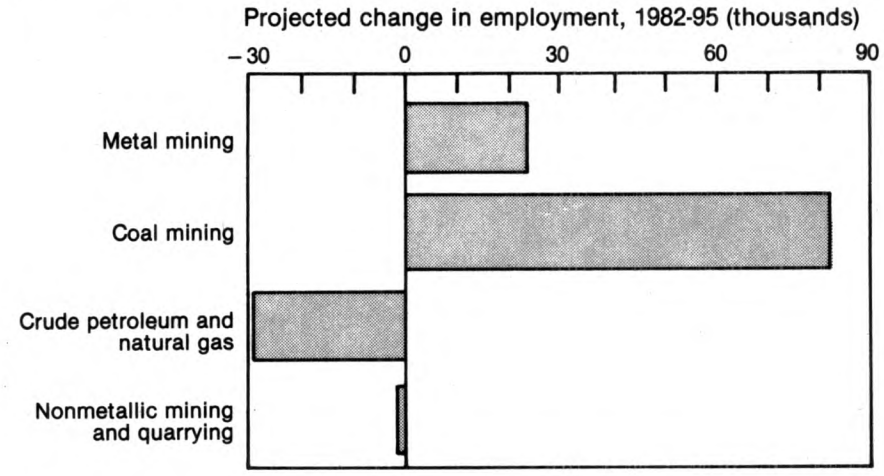
Overall, employment in extractive occupations is expected to grow mainly because of increased demand for coal. Demand for coal is expected to increase greatly through the mid-1990's as the Nation seeks alternative sources of energy to imported oil. The increased use of surface mining is expected to increase the need for bulldozer operators, dragline operators, and power shovel operators. In underground mines, the demand for continuous mining machine operators and longwall miner operators also is expected to grow.

Coal also is an important resource in the production of goods such as steel and cement. Because the demand for these goods is sensitive to changes in the level of economic activity, the demand for coal may decline during economic downturns. Miners may be laid off when demand for coal drops.

In other mining industries, most of the projected employment growth reflects the rebounding of employment from the 1981-82 recession. Improvements in mining techniques are expected to limit employment growth over the long run.

Information on the work, employment, and growth adjective for a variety of extractive occupations appears in the tabulation at the end of this section.

Coal mining will account for most of the growth in employment of extractive workers.



SOURCE: Bureau of Labor Statistics

OTHER CONSTRUCTION AND EXTRACTIVE OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Mine operatives	Includes workers involved in operating a variety of equipment to remove coal, petroleum, and other minerals from the earth.	204,000	Little change is expected
Rotary drill operators	Operate gasoline, diesel, electric or steam draw works to drill oil or gas wells. May also drill shallow boreholes to obtain samples of earth formations, for placement of explosives in seismic prospecting, or for other prospecting tests to discover petroleum. May specialize in drilling underwater wells and be designated Rotary Driller, Marine.	28,000	Little change is expected
Shipwrights	Construct or repair ships, following blueprints or ships' plans. build keel and bilge blocks, cradles, and shoring for supporting ships in drydock, marine railways, shipways, or building docks, using power and hand woodworking tools.	5,500	About as fast as average

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Production Occupations

Cars, gasoline, newspapers, eyeglasses, diamond rings, guided missiles, and most other products have at least one thing in common—they are made by production workers. Most production workers are found in manufacturing plants, but others work in settings as different as shoe repair shops, movie theaters, jewelry stores, and meat markets.

There are thousands of production occupations. In many, workers do only one task in a process that mass produces a single product. A lens inserter, for example, fits lenses into eyeglass frames. In other production jobs, workers do a variety of tasks to produce many different goods. Instrument makers, for example, build precise measuring and regulating devices, completing all of the steps that are required to finish the devices. Some workers perform simple, repetitive operations on large machine tools, while others—jewelers, for example—use handtools to do delicate work. Not all production workers turn out products, however. Some operate complex systems of boilers, generators, pumps, and valves that produce clean water or energy.

Training requirements for production workers vary widely. Some workers who do repetitive tasks can learn their job in a few days. Other jobs require years of experience. Many production workers learn their skills through apprenticeship programs that combine classroom instruction with on-the-job training. Others receive training in public and private vocational schools and in the Armed Forces.

The occupational statements in this chapter describe in detail the work, training, and job outlook for 24 production occupations.

Blue-Collar Worker Supervisors

Nature of the Work

In any organization, someone has to be boss. For the millions of workers who assemble television sets, service automobiles, lay bricks, unload ships, or perform any of thousands of other activities, a blue-collar worker supervisor is the boss. These supervisors direct the activities of other employees and frequently ensure that millions of dollars worth of equipment and materials are used properly and efficiently. While blue-collar worker supervisors are most commonly known as foremen or forewomen, they also have many other titles. In the textile industry, they are referred to as second hands; on ships, they are known as boatswains; and in the construction industry, they are often called overseers, strawbosses, or gang leaders.

Although titles may differ, the job of all blue-collar worker supervisors is similar. They tell other employees what work has to be done and make sure the work is done correctly. For example, manufacturing supervisors may inspect products during and after the production process to make sure that they conform to customer specifications and company standards. Loading supervisors at truck terminals assign workers to load trucks, and then check that the material is loaded correctly and that each truck is fully used. They may mark freight bills and record the load and weight of each truck. Mine car dispatchers control the transport of coal through underground mines.

Because they are responsible for the output of other workers, supervisors make work schedules and keep production and employee records. They plan employees' activities and must allow for unforeseen problems such as absent workers and machine breakdowns. Supervisors teach employees safe work practices and enforce safety rules and regulations. They also may demonstrate timesaving or laborsaving techniques to workers and insure that new employees are properly trained. They often assign trainees to work with experienced workers to learn different aspects of the job.

In addition to their other duties, blue-collar worker supervisors tell their subordinates about company plans and policies; recommend good performers for wage increases, awards, or promotions; and deal with poor performers by retraining them in proper methods, issuing warnings, or recommending that they be disciplined or fired. In companies where employees belong to labor unions, supervisors meet with union representatives to discuss work problems and grievances. They must know the provisions of labor-management contracts and run their operations according to these agreements.

Working Conditions

Although working conditions vary from industry to industry, most blue-collar worker supervisors work in a normal shop environment. They may be on their feet much of the time overseeing the work of subordinates and may be subjected to the noise and grime of machinery.

Since these supervisors are responsible for the work of other blue-collar workers, they may work longer hours in order to be on the job before other workers arrive and after they leave.

First-line supervisors sometimes are caught in the middle between the work force and management. New supervisors who are hired from outside the firm also may face initial hostility from workers who feel they should have been promoted to the job. For many supervisors, these problems are offset by the satisfaction that they may find in having more challenging and prestigious jobs than most blue-collar workers.

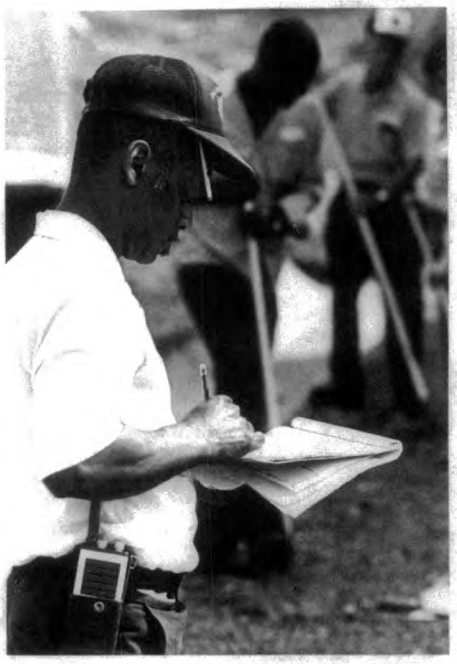
Employment

Blue-collar worker supervisors held about 1.2 million jobs in 1982, about 60,000 fewer than in 1980. This decline reflects the severe dropoff in economic activity during the 1981-82 recession. Although they worked for almost all businesses and government agencies, over half of them worked in manufacturing, supervising the production of cars, washing machines, and thousands of other products. Most of the rest worked in the construction industry, wholesale and retail trade, public utilities, transportation, and government agencies. Employment is distributed in much the same way as the population, and jobs are located in all cities and towns.

Training, Other Qualifications, and Advancement

When choosing supervisors, employers generally look for experience, skill, and leadership qualities. Employers place emphasis on the ability to motivate employees, maintain high morale, command respect, and get along with people. Completion of high school often is the minimum educational requirement, and 1 or 2 years of college or technical school can be very helpful to workers who want to become supervisors.

About 3 of every 4 supervisors rise through the ranks—that is, they are promoted from jobs where they operated a machine, worked on an assembly line, or at a construction craft. This work experience gives them the advantage of



Blue-collar worker supervisors develop work schedules and monitor the production of employees.

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knowing how jobs should be done and what problems may arise. It also provides them with insight into employee attitudes towards management policies. Supervisors are sometimes former union representatives who are familiar with grievance procedures and union contracts. To supplement this work experience, many companies have training programs to help develop supervisory skills.

Although few blue-collar worker supervisors are college graduates, a growing number of employers are hiring trainees with a college or technical school background. This practice is most prevalent in industries with highly technical production processes, such as the aerospace, oil, and electronics industries. Employers generally prefer backgrounds in business administration, industrial relations, mathematics, engineering, or science. New employees undergo on-the-job training until they are able to accept supervisory responsibilities.

Outstanding supervisors, particularly those with college education, may move up to higher management positions. In manufacturing, for example, they may advance to jobs such as department head and plant manager. Some supervisors, particularly in the construction industry, use the experience and skills they gain to go into business for themselves.

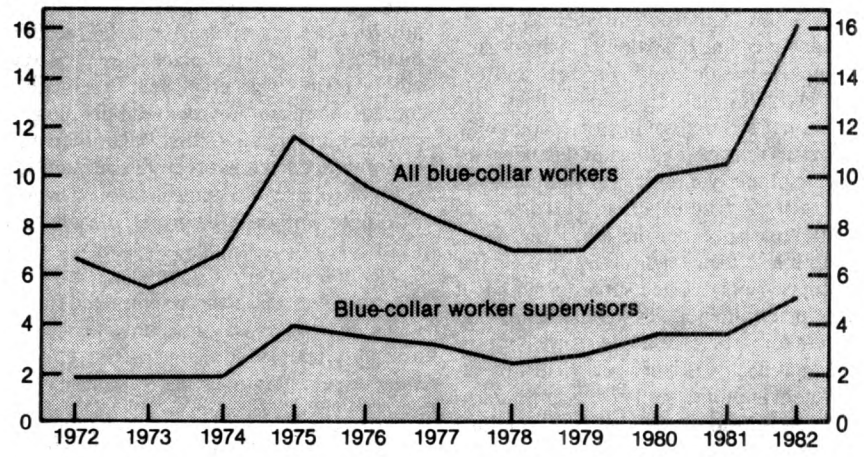
Job Outlook

Employment of blue-collar worker supervisors is expected to increase about as fast as the average for all occupations through the mid-1990's. Rising incomes will stimulate demand for goods such as houses, air-conditioners, TV sets, personal computers, and cars. As a result, more blue-collar workers will be needed to produce these items, and more supervisors will be needed to direct their activities. Although most of these supervisors will continue to work in manufacturing, a large part of the increase in jobs will be in nonmanufacturing industries, especially in the trade and service sectors.

In addition to the jobs resulting in increased demand for supervisors, many openings will arise from the need to replace workers who leave their occupation. Supervisors have a relatively strong attachment to the occupation, but because the occupation is so large, turnover results in a large number of openings.

Because blue-collar worker supervisors are so important to the successful operation of a firm, they are often protected from layoffs during recession. Supervisors in the construction industry, however, may experience periodic layoffs when interest rates cause construction activity to decline.

The unemployment rate for blue-collar worker supervisors is about one-third of the rate for all blue-collar workers.



SOURCE: Bureau of Labor Statistics

Earnings

Median weekly earnings for blue-collar worker supervisors were about $425 in 1982. The middle 50 percent earned between $310 and $560. The lowest 10 percent earned less than $235 and the highest 10 percent earned over $700. Supervisors receive a salary determined by the wage rates of the highest paid workers they supervise. For example, some companies keep wages of supervisors about 10 to 30 percent higher than those of their subordinates. Some supervisors receive overtime pay.

Related Occupations

Other workers with similar supervisory duties include those who supervise professional and technical, sales, clerical, and service workers. Some of these are retail store or retail department managers; bank officers and head tellers; hotel managers, housekeepers, and assistants; postmasters and line supervisors; head cooks; head nurses; and surveyors.

Sources of Additional Information

A bibliography of literature on management occupations is available from:

American Management Association, 135 West 50th St., New York, N.Y. 10020.

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The workers discussed in this section of the *Handbook* produce goods that require a high degree of precision and must meet rigid quality standards. In addition, many of these workers must interpret very detailed instructions and specifications. Tool makers, for example, produce tools such as guides for drill presses that must be made to precise specifications because they are used to make hundreds or even thousands of identical parts. To do the job correctly, the tool maker must be able to read and follow exactly the blueprints provided by the tool designer.

There are no universal training requirements for these workers. Most precision production jobs can be learned informally—starting as a helper and observing experienced workers. Some companies offer in-house training programs on specific areas of the work. The preferred training for many of the more highly skilled occupations—machinists, tool-and-die makers, and lithographers, for example—is completion of a formal apprenticeship program. These programs, which usually last from 3 to 5 years, combine classroom instruction with on-the-job training.

Job prospects for precision production workers vary widely. See the *Handbook* statements that follow for information on the job outlook in specific occupations.

Boilermakers

(D.O.T. 805.261-010, -014, .361-010, -014, and .381-010)

Nature of the Work

Boilers, vats, and other large vessels that hold liquids and gases are essential to many industries. Boilers, for example, supply the steam that drives the huge turbines in electric utility plants and ships. Tanks and vats are used to process and store chemicals, oil, beer, and hundreds of other products. Boilermakers assemble, erect, and repair these vessels and related equipment.

Boilermakers follow blueprints and templates in marking off lines, curves, holes, and dimensions on metal plates and tubes used to make the various parts of a boiler, vat, or tank. Markings must be planned and measured carefully, allowing for the curvature and thickness of the metal. Because errors in size or shape may be difficult or impossible to correct after the metal is cut, these workers use instruments, such as compasses, protractors, gauges, and scales, to make precise measurements.

After they cut and shape the metal to specifications, boilermakers use bolts or temporary welds, called tackwelds, to hold the parts in place while they check to see that parts line up according to the blueprints. They use grinders or cutting torches to remove excess metal, and welding machines to fill in small gaps. A new piece may have to be cut for large gaps.

Small boilers may be assembled at the plant where they are made; however, once the pieces for a larger boiler or tank have been cut out and checked for proper fit, they are transported to the shop or construction site for installation. There, boilermakers assemble and erect the vessels using rigging equipment such as hoists and jacks to lift heavy metal parts into place, and then weld or rivet the parts together. Because installation work must meet statutory safety standards, boilers are carefully tested for leaks and other defects.

Boilermakers also install auxiliary equipment on boilers and other vessels. For example, they install vapor barriers on open-top oil, gas, and chemical storage tanks to prevent fumes from polluting the air, and air pollution control equipment, such as precipitators and smoke scrubbers, in electric plants that burn high-sulfur coal.

Some highly skilled boilermakers (called mechanics) also maintain and make repairs so that boilers remain safe and in good working condition. For example, when boilers occasionally develop leaks, boilermaker mechanics may dismantle the boiler, patch weak spots with metal stock, replace defective sections, or strengthen joints.

Working Conditions

When laying out, fitting, assembling, or repairing boilers, workers often use potentially dangerous equipment, such as acetylene torches and power grinders, and handle heavy materials. Work may be done in cramped quarters inside boilers, vats, or tanks, which are often damp and poorly ventilated. Because workers occasionally work at great heights on top of large vessels, this occupation is more hazardous than many other metalworking occupations. To reduce the chance of injuries, many workers wear protective equipment, such as safety harnesses, safety glasses, and helmets.

Employment

Boilermakers held about 40,000 jobs in 1982, about 4,000 fewer than in 1980. This decline reflects the severe dropoff in manufacturing and construction activity during the 1981-82 recession. About 4 of every 10 boilermakers work in the construction industry, mainly to assemble and erect boilers and other pressure vessels. In addition, many work in the maintenance and repair departments of iron and steel plants, petroleum refineries, railroads, shipyards, and electric powerplants. Large numbers also work for boiler repair firms and in Federal Government installations, principally in Navy shipyards and Federal powerplants. Boilermakers who lay out and fit structural parts together work mainly in plants that make firetube and water-tube boilers, heat exchangers, heavy tanks, and similar products.

Training, Other Qualifications, and Advancement

Although many people have become boilermakers by working for several years as helpers to experienced boilermakers, most training authorities agree that a formal apprenticeship is the best way to learn this trade. Apprenticeship programs usually consist of 4 years of on-the-job training, supplemented by about 150 hours of classroom instruction each year in subjects such as blueprint reading, shop mathematics, and welding. Apprentices often have to travel if work is not available in their locality. If they are laid off, their apprenticeship will take longer than 4 calendar years to complete.

Helpers who learn the craft by working with experienced boilermakers generally reach the journeyman level after at least 4 years on the job. They generally lack the wide range of skills acquired through the apprenticeship process, however.

When hiring apprentices or helpers, employers prefer high school or vocational school

Boilermakers test for leaks or other defects before installation is completed.

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graduates. Courses in shop, mathematics, blueprint reading, welding, and machine metalworking provide a useful background for all boilermaking jobs. Most firms require applicants to pass a physical examination because good health and the capacity to do heavy work are necessary in these jobs. Mechanical aptitude and the manual dexterity needed to handle tools also are important qualifications.

Boilermakers who become skilled in the practical and technical aspects of the trade may advance to supervisory positions. A few go into business for themselves.

Job Outlook

Employment of boilermakers is expected to increase more slowly than the average for all occupations through the mid-1990's. Most openings will arise each year from the need to replace experienced workers who transfer to other fields of work, retire, or die.

The expected construction of many new electric powerplants will create a need for additional boilers and will cause employment of boilermakers to increase. However, an anticipated slowdown in other industries that use boiler products, such as chemical and petroleum refining, would offset much of this increase.

Most of the industries that purchase boilers are sensitive to economic conditions. Therefore, during economic downturns some boilermakers may be laid off, and some may have to move from one area of the country to another to find employment. Because existing boilers must be maintained and repaired even during economic downturns, boilermaker mechanics generally have stable employment prospects. When economic activity declines, some experienced construction boilermakers move into mechanic positions.

Earnings

Median weekly earnings of full time boilermakers were about $490 in 1982; the middle 50 percent earned between $350 and $600 weekly. The lowest 10 percent earned less than $250 and, the top 10 percent earned more than $700. According to a national survey of workers in the construction industry, union wage rates for boilermakers averaged $15.54 an hour. Annual earnings for boilermakers working in the building trades generally are lower than hourly rates would indicate because poor weather conditions and fluctuations in construction activity may adversely affect the number of hours they can work.

Comparable wage data are not available for boilermakers employed in industrial plants. However, hourly wage rates for many union boilermakers employed in fabricated plate work and in the petroleum and shipbuilding industries ranged from about $10 to $14 in 1982. In contrast, the average hourly wages for all nonsupervisory workers in private industry, except farm, was $7.67.

Most boilermakers belong to labor unions. The principal union is the International Brotherhood of Boilermakers, Iron Shipbuilders, Blacksmiths, Forgers and Helpers. Other workers are members of the Industrial Union of Marine and Shipbuilding Workers of America; the Oil, Chemical and Atomic Workers International Union; and the United Steelworkers of America.

Related Occupations

Workers in a number of other occupations assemble, install, or repair metal equipment or machines. These include assemblers, blacksmiths, instrument makers, ironworkers, machinists, millwrights, patternmakers, plumbers, setup workers, sheet-metal workers, tool-and-die makers, and welders.

Sources of Additional Information

For further information regarding boilermaking apprenticeships or other training opportunities, contact local offices of the unions previously mentioned, local construction companies and boiler manufacturers, or the local office of the State employment service.

Bookbinders

(D.O.T. 640.685-010; 641.682-014; 649.685-090; 653.382-010, .682-014, .685-018 and -026; 794.687-026; 795.684-010; 977.381-010 and -014, .684-010, -018, and -022)

Nature of the Work

Bookbinding—the assembly of books in quantity from large, flat printed sheets of paper—is one of the most complicated occupations of the printing industries. Skilled bookbinders operate machines that first fold the printed sheets into units, known as "signatures," so that the pages will be in the right order. They then insert any illustrations that have been printed separately, gather and assemble signatures in proper order, and sew them together. They shape the book bodies with presses and trimming machines and reinforce them with glued fabric strips. Covers are glued or pasted onto the book bodies, and then the books undergo a variety of finishing operations including, often, wrapping in paper jackets. Machines are used extensively throughout the process. Many skilled bookbinders also bind magazines.

Bookbinders seldom perform all the different binding tasks, but many have had training in all of them. In large shops, bookbinders may be assigned to one or a few operations, most often to the operation of complicated machines, such as a large papercutter or a folding machine. When necessary, they repair and adjust bindery equipment.

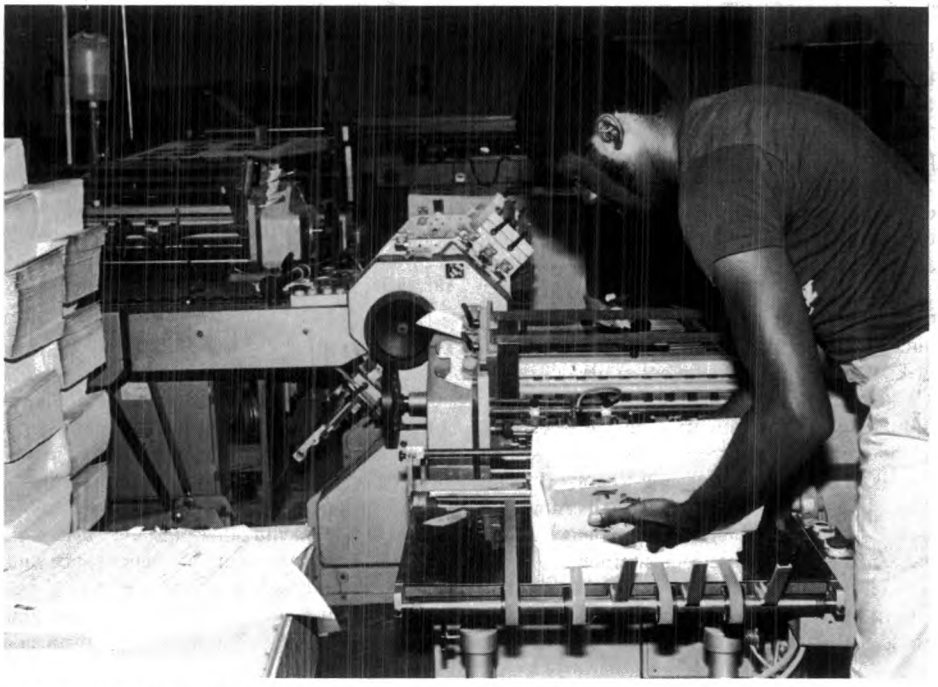
Some bookbinders work in hand binderies, where they design original or special bindings for a limited edition or restore and rebind rare books. This skilled work requires creative ability, knowledge of materials, and a thorough background in the history of binding. Hand bookbinding is perhaps the only kind of binding that gives the individual an opportunity to work at a variety of jobs.

Working Conditions

The job is physically demanding, as bookbinders do considerable lifting, standing, stooping, and carrying. Some large machines, such as cutting machines, require a great deal of physical effort to operate.

Employment

Bookbinders held nearly 30,000 jobs in 1982. Machine bookbinders accounted for approximately 4 out of 5 jobs. Although some jobs are in large libraries or in shops that specialize in bookbinding, most are in commercial printing plants. Because very few publishers maintain



Today most bookbinding is done by machine.

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their own manufacturing facilities, this operation generally is contracted out to independent book printers or trade binders.

Most bookbinders are employed full time.

Although bookbinders work in all parts of the country, employment is concentrated in large printing centers such as New York, Chicago, and Los Angeles.

Training, Other Qualifications, and Advancement

A 4- or 5-year apprenticeship, which includes on-the-job training as well as related classroom instruction, generally is required to qualify as a skilled bookbinder. Apprenticeship applicants usually must have a high school education, mechanical aptitude, and be at least 18 years of age. Apprentices may receive training in all phases of bookbinding, such as renovating old and worn bindings and operating bindery equipment and cutting and trimming machines. In most plants, bookbinders are taught to operate and maintain at least three different pieces of bindery equipment.

High school students interested in bookbinding careers should take shop courses to develop their mechanical skills. Accuracy, patience, neatness, and good eyesight are among qualities needed by bookbinders. Good finger dexterity is essential for those who count, insert, paste, and fold. Artistic ability and imagination are required for hand bookbinding.

Advancement opportunities are limited. In large binderies, experienced bookbinders may advance to supervisory positions.

Job Outlook

Employment of bookbinders is expected to grow as fast as the average for all occupations through the mid-1990's in response to anticipated growth in the printing industry. A moderate increase in book publishing is expected as leisure time activities become more attractive and as the Nation's reading population—especially those in the 35- to- 54 age bracket—continues to grow. As in other occupations, however, most job openings will result from the need to replace experienced bookbinders who change jobs or leave the labor force.

The bookbinding process has become increasingly mechanized through technologies such as conveyor belt systems which transport materials and integral folders which fold pages automatically as they come off the press. Labor requirements have been reduced, and jobs of many bindery workers who assisted skilled bookbinders in the past have been eliminated. While emphasis on productivity improvement is expected to continue in bindery operations, no radical technological changes are on the horizon. The application of modern binding technology is already widespread.

Opportunities for hand bookbinders are limited by the small number of establishments that do this highly specialized work.

Earnings

The basic wage rate for skilled bookbinders varies across the country. In early 1983, basic wage rates for skilled bookbinders in unionized firms ranged from $8.12 to $15.46 an hour, according to a limited number of union contracts.

Related Occupations

Other workers who set up and operate production machinery include papermaking machine operators, press operators, and precision machine operators.

Sources of Additional Information

Details about apprenticeships and other training opportunities may be obtained from local bookbinding shops, local offices of the Graphic Communications International Union, or the local office of the State employment service.

For general information on bookbinding occupations, write to:

Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

Graphic Communications International Union, 1900 L St. NW., Washington, D.C. 20036.

Printing Industries of America, Inc., 1730 N. Lynn St., Arlington, Va. 22209.

Butchers and Meatcutters

(D.O.T. 316)

Nature of the Work

Butchers and meatcutters prepare meat, fish, and poultry in supermarkets or wholesale food outlets. They cut animal carcasses into wholesale cuts such as rounds, loins, ribs, and chucks to facilitate handling and marketing. They use knives and saws to separate wholesale cuts into retail cuts or individual size servings, such as steaks, chops, roasts, filets, and poultry parts. Boneless cuts are fabricated using knives, slicers, or power cutters while bandsaws are required on bony pieces. Meat trimmings are used to prepare hamburgers, sausages, and luncheon meats. Meatcutters in retail foodstores arrange and display meat items in refrigerated cases and assist customers.

Working Conditions

Butchers and meatcutters work in cold rooms to prevent meat from spoiling. The low temperature, combined with the need to stand for long periods of time demand stamina; physical strength may be needed for lifting heavy pieces of meat. To avoid injury, butchers and meatcutters must be careful when working with sharp tools—especially power tools. Health and safety standards require that work areas be clean and sanitary.

Employment

Butchers and meatcutters held about 191,000 jobs in 1982. Most butchers and meatcutters were employed in retail foodstores. A few were employed by restaurants, hotels, hospitals, and other institutions. Jobs are located in almost every city and town in the Nation.

Training, Other Qualifications, and Advancement

Most butchers and meatcutters acquire their skills informally on the job or through apprenticeship programs. A few learn their basic skills by attending private schools specializing in this trade. However, graduates of these schools may need additional on-the-job training and experience to work as butchers and meatcutters.

Generally, on-the-job trainees begin by doing odd jobs, such as removing bones and fat from retail cuts. Under the guidance of skilled butchers and meatcutters, they learn the proper use of tools and equipment and how to prepare various cuts. After demonstrating skill with tools, they learn to divide quarters into wholesale cuts and wholesale cuts into retail and individual portions. Trainees may learn to cut and prepare fish and poultry, roll and tie roasts, prepare sausage, and cure meat. Later, they may learn marketing operations such as inventory control, meat buying, and recordkeeping.

Butchers and meatcutters who learn the trade through apprenticeship programs generally complete 2 years of supervised on-the-job training supplemented by classroom work. At the end of the training period, apprentices must pass a meatcutting test. In some areas, apprentices may become meatcutters without completing the entire training program if they can pass the test.

Most employers prefer applicants who have a high school diploma. Skills important in meatcutting are manual dexterity, good depth perception, color discrimination, and good eye-hand coordination. A pleasant personality, a neat appearance, and the ability to communicate clearly are important qualifications for butchers and meatcutters who wait on customers. Also, strength is needed to lift and move heavy pieces of meat. A health certificate may be required for employment.

Manual dexterity, color discrimination, and good eye-hand coordination are important in cutting meat.

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Butchers and meatcutters may progress to supervisory jobs, such as meat department managers in supermarkets. A few become meat buyers for wholesalers and supermarket chains. Some become grocery store managers or open their own meat markets.

Job Outlook

Employment of butchers and meatcutters is expected to decline slightly through the mid-1990's. Nevertheless, thousands of jobs will be available each year because of the need to replace experienced workers who transfer to other occupations or leave the labor force. As the Nation's population grows, the demand for meat should increase. However, this increase in demand will be more than offset by two trends in meatcutting. One is the increasing practice of central cutting—the cutting and wrapping of meat for several stores at one location. In central cutting meatcutters specialize in both a type of meat they process and the type of cut they prepare, thus increasing efficiency. A second trend is the increasing prevalence of "boxing" here meat is cut and boxed at the meatpacking plant.

Earnings

The median earnings for full time meatcutters in 1982 were about $340 a week. The middle 50 percent earned between about $235 and $440 a week. The lowest tenth earned less than $175 a week, the highest tenth, more than $515.

Hourly earnings of meatcutters averaged $12.17 in 1983, according to a survey of union wage rates for grocery store employees in cities of 100,000 inhabitants or more.

Many butchers and meatcutters are members of the United Food and Commercial Workers International Union.

Related Occupations

Butchers and meatcutters must be skilled at both hand and machine work and must have some knowledge of processes and techniques involved in preparing food. Other occupations in food preparation which require similar skills and knowledge are bakers, cooks, and kitchen supervisors.

Sources of Additional Information

Information about work opportunities can be obtained from local employers or local offices of the State employment service. For information on training and other aspects of the trade, contact:

United Food and Commercial Workers International Union, 1775 K St. NW., Washington, D.C. 20006.

Compositors and Typesetters

(D.O.T. 203.382-026, .582-042, -046, -062, and -074; 221.167-010; 650.582-010, -014, -018, and -022, .682-010, .685-010; 654.382-010, .582-010; and 973.381-010, -014; and 979.381-018 and -022)

Nature of the Work

In small shops, one person may do all the work needed to complete a printing job. In large shops, however, the work is divided among specialists. Among these is the compositors who prepares preliminary printing plates for pressroom workers who do the actual printing. Compositors specialize in typesetting either by "hot type," "cold type," or photocomposition.

Computerized typesetting and composing machines are used in many printing establishments today.

There are several ways of setting and producing printed material. *Hand compositors* make up the oldest composing room occupation but exist only in "hot type" operations. Today, hand typesetting is rarely used except for small specialty jobs in which the setting of type by machine is impractical. Hand typesetters read from the copy and set each line of type, letter by letter, on a "composing stick," a device that holds type in place. They select the place where words will be divided and a hyphen placed if the word does not fit on a line, as well as adjust the spacing of the type with pieces of metal so that the line of type will be equal to the width of the column. As each "stick" is filled, they slide the completed lines into a shallow metal tray called "galley."

Linotype and monotype machine operators are craft workers who operate semiautomatic machines that set type much more rapidly than can be done by hand methods.

Linotype machine operators read from copy clipped to the machine and operate a keyboard to select letters and other characters. As they press the keys, metal molds of the letters are assembled into lines of words. After completing a line, operators touch a lever and the machine automatically fills the molds with molten lead, forming a line of type into a solid metal strip called a "slug." The slugs are assembled into the type frames from which printing plates are made.

Monotype keyboard operators also operate a keyboard machine. However, instead of selecting metal molds, the monotype machine produces a perforated paper tape. The operators feed the tape into a machine that reads the tape and automatically selects metal molds for each letter. The machine then forces molten metal into each mold to form the type.

While machines make their tasks easier, monotype and linotype machine operators must hyphenate and adjust type spacing to fit the width of columns. In small plants, operators also may maintain and repair typesetting machines.

Some typesetting will continue to be done by hand or with monotype and linotype machines. However, the craft of composing and typesetting has been revolutionized by technological advances. Together, photography and computers have changed the way written material and graphics are converted into print. Computer-generated typesetting is firmly established at most large daily newspapers, and some papers are using electronic pagination, or page make-up, systems.

With phototypesetting equipment, a photographic process replaces the casting of type, and the final product is a photographic positive film or paper of the type rather than a metal slug. In a common type of phototypesetting, a *phototypesetter* types in the text without regard to column width or hyphenation and produces a perforated paper or magnetic tape. The operator then feeds the tape containing the text into a computer that is programmed to do hyphenation and create columns of text. The computer creates a second tape—containing the text as it will appear when printed—that phototypesetters insert into a photocomposition machine.

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This machine displays the individual characters on the tape and photographs them. The phototypesetter then develops films of the material to be printed.

The most advanced method of typesetting uses electronic phototypesetting equipment. With this equipment, an operator uses a keyboard to select the size and style of type the column width, and to provide spacing instructions, as well as to store each character in a computer. The computer then displays columns of type on a screen that is similar to a TV picture tube. Operators visually check the text and make any required corrections. The information is then transmitted to a phototypesetter which produces a film of the material. These machines can prepare entire pages of type complete with any pictures to accompany the text.

After the copy is set, typesetters pass it to other compositors who arrange the columns of type, pictures, and illustrations according to the layout for each page submitted by the editor. If letterpress printing equipment is being used, they assemble the metal type and photoengravings in a large metal frame that clamps all the pieces together. If lithographic film equipment is being used, they cut the film of type and pictures and tape the pieces in place.

After arranging all the pages of a particular job in proper sequence, compositors make page proofs to review the entire job. Page proofs are checked with the original copy for errors and returned to the editor for final changes. After final changes have been put into the type, the plate is sent to the pressroom where production printing plates are made.

Working Conditions

Hand compositors are on their feet most of the time and do some heavy lifting. Typesetting machine operators sit for long periods of time. Monotype and linotype machines are very noisy.

All compositors may be required to work overtime to meet publication deadlines; some regularly work evening or nightshifts. Compositors employed by newspapers may work holidays and weekends.

Employment

Compositors and typesetters held about 104,000 jobs in 1982. Nearly 40 percent of the jobs were in newspaper plants; 18 percent were in commercial printing plants. The remainder were in other kinds of printing and publishing firms; business services including mailing, reproduction, commercial art, and stenographic services; and in a wide range of firms that do their own printing.

Composing room workers are located in almost every community throughout the country, but they are concentrated in large printing centers such as New York, Los Angeles, and Chicago.

Training, Other Qualifications, and Advancement

In the past, almost all compositors were trained through some type of apprenticeship program. However, this has changed with the introduction of new technology, which has had the effect of lowering skill requirements. More and more compositors are bypassing the traditional apprentice approach and learning the craft on the job. In addition, many firms are small and thus cannot afford the time and money to develop formal training programs.

In large companies, persons who want to become all-round compositors generally are trained through an apprenticeship program. Most of these programs emphasize operation of phototypesetting machines and in photocomposition work. Generally, apprenticeship covers a 4-year period of training, supplemented by classroom instruction or correspondence courses. However, this period may be shortened by as much as 2 to 2 1/2 years for apprentices who have had previous experience or schooling or who show the ability to learn the trade more rapidly.

Applicants for training must be high school graduates and in good physical condition. Individuals interested in working for firms that utilize advanced printing technology need sufficient knowledge of electronics and computers, including computer programming to indicate an aptitude for mastering computerized photocomposition equipment.

Persons with good typing skills can learn to be phototypesetting machine operators in a relatively short period of time. These workers need not be trained as skilled compositors, but they must be familiar with printing terms and measures.

In recent years, many monotype and linotype operators have been retrained as phototypesetting operators.

Manual dexterity and the ability to pay attention to detail and to work independently are important qualities for a compositor in layout work.

Job Outlook

Employment of compositors and typesetters is expected to decline through the mid-1990's as electronic composition systems continue to reduce labor requirements in composing rooms. Thus far, implementation of technologies such as typesetting computers, video display terminals (VDT), and phototypesetting machines have had their greatest impact on compositors and typesetters employed by newspapers. VDT equipment, for example, shifts much of the responsibility for composition and typesetting from the composing room to the editorial room. Electronic page make-up systems (pagination) also eliminate some functions of compositors, such as laying out pages. Some newspaper composing room workers have been retrained for other jobs, while others have retired early or have taken jobs in printing firms that do not yet use electronic composition.

Cost is a major factor in the implementation of advanced technologies. At present, newspapers are among the most intensive users of electronic composition, but applications of typesetting computers are expected to grow, especially with the development of microprocessor technology which will reduce the size and cost of equipment and make it more accessible to small printing firms. When electronic composition becomes cost-effective for small plants, the decline in employment of compositors and typesetters is bound to accelerate.

Attrition is an important way of dealing with a reduction in labor requirements, and in firms implementing new labor-saving technologies, jobs vacated by experienced compositors and typesetters generally are not filled. In other printing plants, however, replacement needs will generate job openings in the years ahead.

For the jobs that do become available, opportunities should be best for persons who have completed post-high school programs in printing technology, such as those offered by community colleges and vocational-technical institutes. Many employers prefer to hire applicants who have completed these programs because the comprehensive training they receive helps them learn composing room trades and adapt to new processes and techniques more rapidly.

Although most opportunities will be in the printing industry, a growing number of jobs will be in other industries, such as paper and textile mills, which are doing their own typesetting instead of contracting it to printing firms.

Earnings

The basic wage rate for compositors varies across the country. In early 1983, basic wage rates for compositors in unionized firms ranged from $9.52 to $18.31 an hour, according to limited data from union contracts.

Related Occupations

Other occupations in which workers operate machines equipped with a typewriter-like keyboard include clerk-typists, computer terminal system operators, keypunch operators, and telegraphic-typewriter operators.

Sources of Additional Information

Details about apprenticeship and other training opportunities may be obtained from local employers such as newspapers and printing shops, the local office of the International Typographical Union, or the local office of the State employment service.

For general information on composing room occupations, write to:

Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

Printing Industries of America, Inc., 1730 N. Lynn St., Arlington, Va. 22209.

Dental Laboratory Technicians

(D.O.T. 712.281-010 and .381-014, -018, and -030)

Nature of the Work

Dental laboratory technicians are skilled craft workers who make and repair a wide variety of

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dental appliances, such as dentures, inlays, crowns, and braces. All work is done according to written instructions submitted by the dentist. Technicians work with plastics, ceramics, and metals. They use models of dental stone or plaster pourings made from impressions of a patient's teeth or mouth taken by the dentist. Sometimes these models are made by the dentist or an assistant, but most often by the technician.

Most technicians specialize. For example, a *denture contour wire specialist* (D.O.T. 712.381-014) makes and repairs contoured wire frames and retainers for teeth used in dentures; a *dental ceramist* (D.O.T. 712.281-010) applies porcelain paste over a metal framework to form dental crowns, bridges, and tooth facings; an *orthodontic technician* (D.O.T. 712.381-030) makes appliances for straightening teeth; and some technicians fabricate and repair full and partial dentures.

Trainees in beginning jobs usually mix and pour plaster into casts and molds and perform other simple tasks. As they gain experience, they do more difficult laboratory work such as arranging artificial teeth on dental appliances, working with dental ceramics (porcelain), or making castings of gold or chrome metal alloys. Technicians use small hand instruments such as wax spatulas and wax carvers, as well as special electric lathes and drills, high-heat furnaces, metal-melting torches, and other specialized laboratory equipment.

Working Conditions

Whether they are employed in independent commercial laboratories, dental offices, or in home laboratories, dental technicians work in typical laboratory surroundings. Work areas are generally clean, well lighted, and well ventilated. Technicians usually have their own workbenches which are equipped with Bunsen burners, grinding and polishing machines, and various handtools. The work is not strenuous, and although there may be pressure to meet schedules, dentists' deadlines usually are flexible enough to allow for any problems or special requirements that may be involved in completing a difficult job.

Dental laboratory technicians do precise work.

Salaried technicians usually work 40 hours a week but self-employed technicians frequently work longer hours.

Employment

Dental laboratory technicians held about 51,000 jobs in 1982. Most jobs were in commercial dental laboratories, which usually are small, privately owned businesses with fewer than 10 employees. However, a few laboratories are much larger, and employ over 200 technicians. Dental laboratories are located mainly in large cities and populous States. Many laboratories receive work through the mail from dentists who work a considerable distance away.

About 9,000 dental laboratory technicians worked in dentists' offices. Others worked for hospitals that provide dental services and for the Federal Government, chiefly in Veterans Administration hospitals and clinics.

Approximately 1 technician in 5 is self-employed, a higher proportion than in most other occupations. Some of these jobs are held by technicians who "moonlight," doing work in home dental laboratories in addition to their regular job.

Training, Other Qualifications, and Advancement

Most dental laboratory technicians learn their craft on the job, usually in 3 to 4 years. High school graduates are preferred, and courses in art, metal shop, and science are helpful. Many of those hired as trainees already have some knowledge of dental laboratory work, usually because they have taken courses or completed formal training programs.

Training in dental laboratory technology is available through community and junior colleges, vocational-technical institutes, and trade schools; high school vocational education programs; apprenticeships; and the Armed Forces. Formal training programs vary greatly both in length and the level of skill they impart. Accredited programs generally take 2 years to complete and lead to an associate degree, although some lead to a certificate or diploma.

In 1982, 58 programs in dental laboratory technology were approved (accredited) by the Commission on Dental Accreditation in conjuction with the American Dental Association (ADA). These programs provide classroom instruction in dental law and ethics, chemistry, ceramics, metallurgy, and related subjects. In addition, each student is given supervised practical experience in the school or an associated dental laboratory.

Students who have taken enough courses to learn the basics of the craft generally are considered by employers to be good candidates for training, regardless of whether they have completed the formal program. (Many students—vocational education students and apprentices in particular—drop out before completing the entire sequence of courses.) However, even graduates of 2-year training programs need about 3 additional years of practical experience to become fully qualified in the craft. Military personnel who receive dental laboratory training in the Armed Forces usually qualify for civilian jobs as dental laboratory technicians.

Certification, which is voluntary, is offered by the National Board for Certification, a trust established by the National Association of Dental Laboratories. Certification is increasingly important as evidence of a technician's competence.

Dental technicians, depending upon their skill, experience, and education, may advance to supervisory or managerial positions. Most of today's commercial laboratory owners came up "from the bench" to own their own business. For some technicians, career advancement means moving into a related job within the dental field; well-qualified technicians may become instructors in dental lab training programs, or sales representatives for dental products companies.

Among the personal traits important in this occupation are a high degree of finger dexterity, good vision, and the ability to recognize very fine color shadings. These attributes must be combined with the ability to follow instructions and an inclination for detailed and absolutely accurate work. High school students interested in careers in this occupation are advised to take courses in art, crafts, metal shop, metallurgy, and sciences.

Job Outlook

Job opportunities for dental laboratory technicians through the mid-1990's will reflect employment growth equal to the average for all occupations plus the need to replace experienced technicians who leave the occupation.

Rising incomes, population changes, and dental prepayment plans will contribute to future employment growth. The population will include a larger proportion of elderly people, a group with a high level of need for the crowns, bridges, and dentures produced by dental laboratory technicians. The growing popularity of orthodontal work well beyond adolescent years may further heighten demand for dental laboratory services. Emphasis on orthodontic and cosmetic work may be spurred by dentists' marketing efforts, as competition among practitioners intensifies, not only for clientele, but for income-maximizing services.

Because dental laboratory technicians exhibit relatively strong attachment to the field, replacement needs are less important as a source of jobs than is the case for most other workers. However, some experienced workers leave dental laboratory technology each year to transfer to other occupations, and some retire.

Despite the trend toward corporate ownership of medical and dental laboratories, opportunities should be good for experienced technicians who wish to establish laboratories of their own. A technician whose work has become known to several dentists in a community will have the best prospects of building a successful business.

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Earnings

Dental laboratory technicians who worked full time in commercial laboratories received salaries of about $18,000-$20,000 in 1982, according to the limited data available. Generally, education and experience, along with a specialized skill, bring higher earnings. For example, technicians who specialize in ceramics receive much higher salaries than those who specialize in contour wire framing. Large dental laboratories employ supervisors or managers who usually earn more than technicians. In general, earnings of self-employed technicians exceed those of salaried workers.

In the Federal Government, graduates of ADA-approved programs with no experience were paid starting salaries of about $12,000 in 1982. Experienced dental laboratory technicians employed in the Federal Government had average earnings of about $20,400 in 1982.

Many technicians in commercial laboratories receive paid holidays and vacations and some also receive paid sick leave, bonuses, and other fringe benefits. Technicians employed by the Federal Government have the same benefits as other Federal employees.

Related Occupations

Dental laboratory technicians make artificial teeth, crowns and inlays, and orthodontic appliances following the specifications and instructions provided by the dentist. Other workers who make medical devices include arch-support technicians, orthotics technicians (braces and surgical supports), prosthetics technicians (artificial limbs and appliances), opticians, and ophthalmic laboratory technicians.

Sources of Additional Information

For information about training and a list of approved schools, contact:

American Dental Association, Council on Dental Education, Division of Educational Measurement, 211 E. Chicago Ave., Chicago, Ill. 60611.

Information on scholarships is available from dental technology schools or from the American Fund for Dental Health, 211 E. Chicago Ave., Chicago, Ill. 60611.

For information on career opportunities in commercial laboratories and requirements for certification, contact:

National Association of Dental Laboratories, 3801 Mt. Vernon Ave., Alexandria, Va. 22305.

Dispensing Opticians and Ophthalmic Laboratory Technicians

(D.O.T. 299.474-010; 713.361-010 and -014, .681-010 and .684-026 and -038; 716.280-008, -010, and -014, .360-010, .382-010, -018, and -022, .462-010, .681-018, .682-010, -014, and -018, and .685-018 and -022)

Nature of Work

Half the people in the United States use glasses or contact lenses, and workers in a variety of occupations are involved in providing vision care. Among these are dispensing opticians and ophthalmic laboratory technicians, who make and fit eyeglasses and contact lenses.

The health practitioners who examine eyes are ophthalmologists and optometrists; normally they serve as the initial contact in the vision care field. After a checkup by one of these eye doctors, who writes the prescription, people who need corrective lenses generally visit a dispensing optician (also called an *ophthalmic dispenser*). Some optometrists and ophthalmologists do their own dispensing and laboratory work, or employ an optician and/or technician to do it for them.

Dispensing opticians order the necessary ophthalmic laboratory work, help the customer select appropriate frames, and adjust the finished eyeglasses. In many States they fit contact lenses.

During the customer's visit, the optician measures the distance between the centers of the pupils of the eyes to determine where lenses should be placed in relation to them. In helping customers select from the various styles and colors of eyeglass frames, they consider the customer's hairstyle and facial features, occupation and habits, and the weight and thickness of the corrective lenses.

The optician then prepares work orders that give the ophthalmic laboratory the information it needs to grind the lenses and insert them in a frame. The work orders include lens prescriptions and information on lens size, color, and style. Some dispensing opticians do their own lab work, preparing the lenses themselves. After the glasses are made, the optician checks the power and surface quality of the lenses with special instruments, then adjusts the frame to the contours of the customer's face and head so that it fits properly and comfortably. Adjustments are made with handtools, such as optical pliers, files, and screwdrivers.

In fitting contact lenses, dispensing opticians follow ophthalmologists' or optometrists' prescriptions, measure the corneas of customers' eyes, and then prepare specifications for the contact lens manufacturer. Contact lens fitting requires considerably more skill, care, and patience than conventional eyeglass fitting. Dispensing opticians tell customers how to insert, remove, and care for contact lenses during the initial adjustment period, which may last several weeks. At each visit the dispensing optician looks at the patient's eyes, corneas, lids, and contact lenses with special instruments and microscopes. Ophthalmologists or optometrists recheck the fit, as needed. Opticians may make minor adjustments; lenses are returned to the manufacturer for major changes.

The majority of dispensing opticians design and fit eyeglasses and contact lenses, but some specialize in the fitting of cosmetic shells to cover blemished eyes. Still others specialize in the fitting of prostheses (artificial eyes). In some shops, they may do lens grinding and finishing and sell other optical goods such as binoculars, magnifying glasses, and nonprescription eyeglasses (sunglasses, for instance).

Ophthalmic laboratory technicians (also called *optical mechanics*) make prescription eyeglasses. Following the specifications provided by a dispensing optician, ophthalmologist, or optometrist, they cut, grind, and finish prescription lenses and assemble them with frames to produce finished glasses. Some technicians make contact lenses.

There are two types of ophthalmic laboratory technicians: Surfacer (or lens grinder) and bench technician (or finisher). In small laboratories, one person may do both jobs. Starting with standard size lens blanks, which large optical firms mass-produce, surfacers set up and operate machines to grind and polish eyeglass lenses according to prescription specifications. They use precision instruments, such as focimeters and objective lens analyzers, to measure the lenses and make sure that they fit the prescription. In large laboratories, work is divided into separate operations which are performed mainly by workers who operate power grinding and polishing machines.

Bench technicians mark and cut lenses and smooth their edges to fit frames. They then assemble the lenses and frame parts into finished glasses. Bench technicians use special tools, such as lens cutters and glass drills, as well as small files, pliers, and other handtools. They also use automatic edging machines to shape lens edges and precision instruments to detect imperfections. In large laboratories, the duties of bench technicians are divided into several operations which are performed mainly by skilled workers.

Working Conditions

Dispensing opticians work indoors in pleasant, quiet surroundings that are well lighted and well ventilated. Because they sell and service eye lenses, they deal with customers most of the time. They spend part of their time on their feet. Dispensing opticians generally work a 40-hour week, although a 45- or 50-hour week is not uncommon. Some, especially those employed in retail shops in large shopping centers, work in the evenings and on Saturdays.

Ophthalmic laboratory technicians work with machines that make a constant humming, whining sound. Sometimes they need to wear goggles to protect their eyes. Because most of their time on the job is spent standing, these workers are subject to fatigue. Most ophthalmic laboratory technicians work a 5-day, 40-hour week.

Employment

Dispensing opticians and ophthalmic laboratory technicians held about 39,000 jobs in 1982. Most were full time.

Most dispensing opticians work for optical shops or for department stores, drug stores, and other retail outlets. About one third work for ophthalmologists or optometrists who sell glasses directly to patients. A few work in hospitals and eye clinics or teach in schools of ophthalmic dispensing. Some own retail optical shops.

Ophthalmic laboratory technicians work in ophthalmic laboratories, for the most part.

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The work of ophthalmic laboratory technicians is very precise.

However, some work for opticians or for department stores, drugstores, and other retail firms that have optical departments. A few work for ophthalmologists or optometrists who dispense glasses directly to patients.

Employment of dispensing opticians and ophthalmic laboratory technicians is widely dispersed, and tends to follow overall population patterns.

Training, Other Qualifications, and Advancement

Dispensing opticians. Most dispensing opticians learn their skills on the job. However, employers generally prefer applicants who are familiar with the trade and an increasing number of trainees have some formal training in optical dispensing and fabricating. On-the-job training in dispensing work may last several years and usually includes instruction in optical mathematics, optical physics, and the use of precision measuring instruments and other machinery and tools. Training programs vary from employer to employer. In large companies, on-the-job training is structured much like an apprenticeship program, while training in small establishments is largely informal.

Employers considering applicants for entry level jobs in optical dispensing look for high school graduates who have had courses in science and mathematics. Knowledge of physics, algebra, geometry, and mechanical drawing is particularly valuable. Previous experience in a related job is an asset. Because dispensing opticians deal directly with the public, they should be tactful and have pleasant personalities. Good communications skills are highly valued.

Formal training in opticianry is offered by community colleges, vocational-technical institutes, trade schools, and manufacturers in programs that last from a few weeks to several years. In 1982, 15 schools offered 2-year programs in optical fabricating and dispensing leading to an associate degree. The Commission on Opticianry Accreditation—an organization created by the American Board of Opticianry, the National Academy of Opticianry, and the Opticians Association of America—accredits 10 of these programs. A number of schools offer shorter programs, usually 6 months to 1 year in length, that lead to a certificate or diploma in opticianry. In addition, some medical schools, contact lens manufacturers, and professional societies offer short, nondegree courses in contact-lens fitting. A small number of opticians learn their trade in the Armed Forces.

Some opticians acquire their skills through 2- to 4-year apprenticeship programs offered by optical dispensing companies. Apprentices with exceptional ability may complete their training in a shorter period. Individual States set the entrance requirements for these programs, with high school graduation ordinarily required. Apprentices receive training in optical mathematics and optical physics and in the use of laboratory equipment. In addition to technical training, apprentices may work directly with patients in fitting eyeglasses and contact lenses. Trainees also are taught the basics of office management and sales. In States requiring dispensing opticians to be licensed, information about apprenticeships is available from the State agency responsible for occupational licensing. In the other States, information is available from the Division of Apprenticeship Training of the State Department of Labor.

Credentials for dispensing opticians are gained through licensure—required by law in 20 States and Puerto Rico—and through voluntary certification or registration. States that require a license to dispense eyeglasses are: Arizona, Arkansas, California, Connecticut, Florida, Georgia, Hawaii, Kentucky, Massachusetts, Nevada, New Jersey, New York, North Carolina, Ohio, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, and Washington. For specific information about licensing procedures, consult the State board of occupational licensing.

Certification is offered by the American Board of Opticianry and by the National Committee of Contact Lens Examiners. Continuing education normally is required to maintain certification.

Many dispensing opticians go into business for themselves. Others become managers of retail optical stores or sales representatives for wholesalers or manufacturers of eyeglasses or lenses.

Ophthalmic laboratory technicians. Ophthalmic laboratory technicians also learn their skills on the job. Employers prefer applicants for entry level jobs to be high school graduates who have had courses in science and mathematics. A knowledge of physics, algebra, geometry, and mechanical drawing is valuable. Interest in and ability to do precision work are essential.

At first, technician trainees perform simple tasks such as processing lenses through a grinding machine. As they gain experience, they progress to operations such as lens cutting and eyeglass assembly. When trainees have acquired experience in many types of work, which usually takes about 3 years, they are considered all-round optical mechanics. Some technicians specialize in one type of job, such as surfacing or bench work. A specialist requires less training than an all-round technician.

Besides on-the-job training, there are other routes to enter this occupation. High school graduates can prepare to become technicians through 3- to 4-year formal apprenticeship programs operated by optical goods companies. Apprentices with exceptional ability may complete their training in a shorter period. Require-

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ments for entry into these programs vary from State to State, but high school graduation usually is needed. Apprentices have more opportunities for jobs and advancement than those without such training. Persons interested in apprenticeships should check with the Division of Apprenticeship Training of their State's Department of Labor.

Apprentices are generally trained to be either ophthalmic surfacers or finishers. Ophthalmic surfacers receive training in lens grinding, and ophthalmic finishers learn to assemble eyeglasses into frames and to do frame repair.

Some technicians learn their trade in the Armed Forces. Others complete programs in optical technology at community colleges, vocational-technical institutes, or trade schools. Graduates receive certificates, diplomas, or associate degrees for programs varying in length from 6 months to 2 years. Graduates generally need some additional on-the-job training.

New Jersey is the only State that requires ophthalmic laboratory technicians to be licensed.

Ophthalmic laboratory technicians can become supervisors and managers. Some technicians become dispensing opticians, although the trend is to train specifically for optician jobs. Some technicians, especially those receiving their training in both shop and dispensing work, may go into business for themselves.

Job Outlook

Employment in these occupations is expected to increase about as fast as the average for all occupations through the mid-1990's in response to the demand for corrective lenses.

Initially the projected increase in employment will constitute a rebound to pre-recession levels, for employment of dispensing opticians and ophthalmic laboratory technicians declined during the 1981-82 recession. Both occupations are vulnerable to changes in the business cycle, with employment falling somewhat during downturns and rising during periods of economic recovery. As is generally the case, however, most openings will arise from the need to replace experienced workers who transfer to other kinds of work or leave the labor force.

Demand for corrective lenses is expected to rise as a result of demographic trends: Not only is the population growing, but the number of middle-aged and elderly persons is projected to rise substantially over the next decade. Members of the baby boom generation will be entering middle age, a time when normal physiological changes cause many persons to begin using corrective lenses for the first time. Older persons require more vision care, on the whole, than others.

Increasing public awareness of the importance of good eyesight (stimulated, for instance, by the vision screening programs in schools) is also likely to spur demand. Industrial safety precautions may require more safety goggles and glasses. Fashion, too, is likely to influence demand. The growing variety of frame styles and colors—as well as the increasing popularity of contact lenses—should encourage individuals to buy more than one pair of corrective lenses. Finally, additional demand may be created by new products such as bifocal contact lenses and extended wear contact lenses.

Employment of dispensing opticians is expected to grow more rapidly than that of ophthalmic laboratory technicians, due to productivity improvements that have reduced labor requirements in optical laboratories. Grinding and polishing machines have become increasingly sophisticated, and, in larger laboratories, automated equipment has taken over some tasks previously handled by technicians.

Employment opportunities should be excellent for dispensing opticians who have an associate degree in opticianry. Opportunities will be best in metropolitan areas because owners operate many of the retail shops in small communities and do not need dispensing opticians. Job opportunities for ophthalmic laboratory technicians should be best for persons who have completed a formal training program.

Earnings

The starting hourly wage rate for dispensing opticians in one of the higher paying areas of the country ranged from $10.63 to $11.75 in 1983, based on information from a small number of union contracts. In the same area, ophthalmic laboratory technicians earned a starting hourly wage rate of $10.00 in 1983.

According to a 1982 survey published in *Optical Index*, annual salaries of dispensing opticians in their first year of practice ranged from $15,000 to $16,500.

Dispensing opticians who own and operate their own shops can expect to earn considerably more, generally from $25,000 to $32,000 a year.

Apprentices in both occupations start at a wage of about 60 percent of the skilled worker's rate and receive periodic increases so that upon completion of the apprenticeship program, they are earning the beginning rate for experienced workers.

Some dispensing opticians and ophthalmic laboratory technicians are members of unions. The principal union in this field is the International Union of Electronic, Electrical, Technical, Salaried and Machine Workers (AFL-CIO).

Related Occupations

Other occupations in which workers use machines and tools for precise, delicate work include biomedical equipment technician, calibrator, dental laboratory technician, glass blower, instrument repairer, locksmith, orthodontic technician, prosthetics technician, and watch repairer.

Sources of Additional Information

For general information about these occupations, contact:

International Union of Electronic, Electrical, Technical, Salaried and Machine Workers, 1126 16th St. NW., Washington, D.C. 20036.

National Federation of Opticianry Schools, Opticianry Program, J. Sargeant Reynolds Community College, P.O. Box 12084, Richmond, Va. 23241.

Opticians Association of America, 1250 Connecticut Ave. NW., Washington, D.C. 20036.

Chairperson of Optical Council, IUE-AFL-CIO, 200 Park Ave. South, New York, N.Y. 10003.

A list of schools is available from either of the following organizations:

National Academy of Opticianry, 10111 George Palmer Hwy., Suite 112, Bowie, Md. 20716.

National Federation of Opticianry Schools, Opticianry Program, J. Sargeant Reynolds Community College, P.O. Box 12084, Richmond, Va. 23241.

Furniture Upholsterers

(D.O.T. 780.381-018, -022; and .684-122)

Nature of the Work

Upholsterers recondition sofas, chairs, and other upholstered furniture by replacing worn and damaged fabrics, springs, and padding. (Workers employed in the manufacture of upholstered furniture are not included in this statement.) Whether restoring a treasured antique or simply giving an ordinary living room couch a facelift, upholsterers combine knowledge of fabrics and other materials with artistic flair and manual skill.

All custom upholstery involves two steps: Removing the old cover, padding, and springs; and rebuilding the piece. However, because of differences in the way furniture is constructed, each job is unique.

Upholsterers usually place the furniture on padded wooden benches or some other type of support so that they may work at a convenient level. Using hammers and tack pullers, they remove tacks or staples that hold the old fabric to the wooden frame. After stripping the old fabric, they remove the burlap and padding that cover the arms, back, sides, and seat. Upholsterers examine the springs and remove broken or bent ones. The springs sit on a cloth mat called webbing that is attached to the frame. If webbing is worn, upholsterers remove all the springs and all the webbing.

When rebuilding the furniture, upholsterers may reglue loose sections of the frame and refinish exposed wood. They tack webbing to one side of the frame, stretch it tight, and tack it to the opposite side. Other webbing is woven across the first and attached to the frame to form a new mat. After putting springs on the mat so they compress evenly, upholsterers sew or staple each spring to the webbing or frame and tie each spring to the ones next to it. Burlap then is stretched over the springs, cut and smoothed, and tacked to the frame. To form a smooth rounded surface over the springs and other parts of the frame, upholsterers cover each section of the furniture—seat, back, arms—with filling material. After sewing the filling to the burlap, they cover it with a layer of felt and heavy cloth and tack the cloth to the frame. Finally, upholsterers put on the new fabric cover, which has been cut to size for a section, such as an arm or

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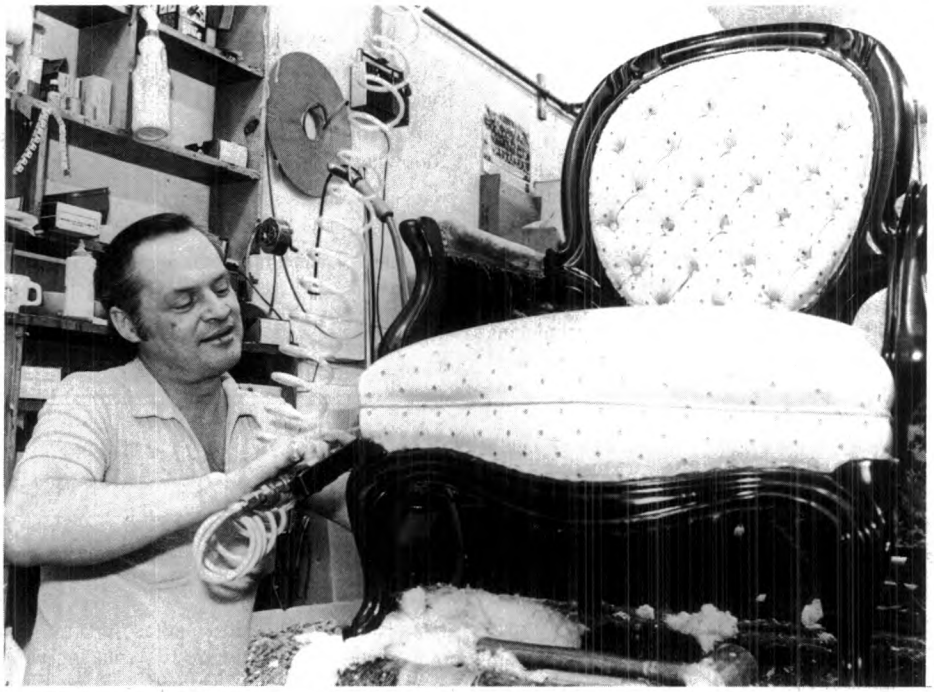


Most furniture upholsterers work in small upholstery shops.

the back, and temporarily stitched together for fitting. After checking that the cover fits tightly and smoothly—or noting where adjustments are necessary—they remove the cover and sew it together and tack, staple, or glue it to the frame. To complete the job, upholsterers sew, tack, or glue on fringe, buttons, or other ornaments.

Upholsterers use a variety of common handtools, including hammers, staple guns, tack and staple removers, pliers, and shears, and special tools such as webbing stretchers and upholstery needles. They also use sewing machines.

Sometimes upholsterers pick up and deliver furniture or help customers select new furniture coverings. Those who manage an upholstery shop order supplies and equipment and keep business records.

Working Conditions

Working conditions in upholstery shops vary—many shops are spacious, adequately lighted, well ventilated, and well heated; others are small and dusty. Upholsterers stand while they work and do a considerable amount of stooping and bending and some heavy lifting.

Employment

Furniture upholsterers held about 37,000 jobs in 1982. Most furniture upholsterers work in upholstery shops, either their own or someone else's. These shops generally have fewer than three workers. Some upholsterers are employed by furniture stores. A few work for businesses, such as hotels, that maintain their own furniture.

Employment of upholsterers is concentrated in metropolitan areas, where the large population provides the greatest demand for upholsterers' services.

Training, Other Qualifications, and Advancement

The best way to enter this trade is to start as a helper in an upholstery shop and learn on the job. Helpers learn by upholstering furniture under the direction of experienced workers. Much time and practice are needed to learn complex tasks such as measuring and cutting the new fabric and sewing and attaching it to the frame with a minimum of waste. Usually about 3 years of on-the-job training are required to become a fully skilled upholsterer.

Inexperienced persons may get basic training in upholstery from vocational or high school courses. However, additional training and experience in a shop usually are required before these workers can work as quickly and efficiently as experienced upholsterers. Although completion of an upholstery course does not assure a job, employers generally prefer to hire people with some knowledge of the trade.

Upholsterers should have manual dexterity, good coordination, and be able to do occasional heavy lifting. An eye for detail and flair for creative use of fabrics are helpful.

The major form of advancement for upholsterers is opening their own shop. It is easy to open a shop because only a small investment in handtools and a sewing machine is needed. However, the upholstery business is extremely competitive, so operating a shop successfully is difficult.

Job Outlook

Employment of upholsterers is expected to grow more slowly than the average for all occupations through the mid-1990's. Most job openings will arise because of the need to replace experienced workers who transfer to other occupations, retire, or die.

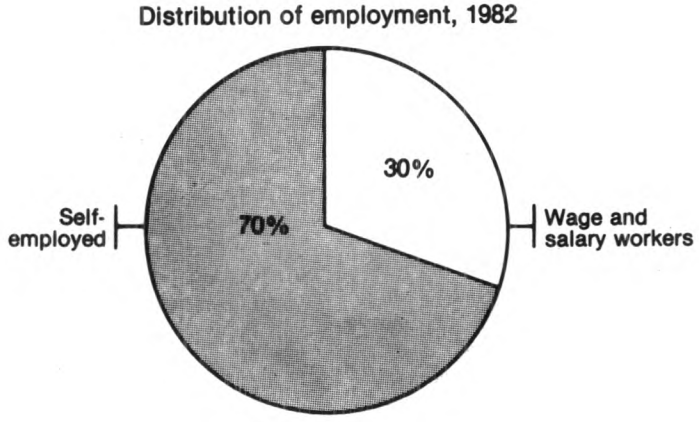
More upholstered furniture will be used as population, personal income, and business expenditures grow. However, the demand for upholsterers will not keep pace with this growth because, increasingly, consumers replace worn furniture rather than reupholster it. Demand due to reupholstering of high quality and antique furniture will account for most of the limited employment growth.

Earnings

In 1982, hourly pay rates ranged from $9 to $12 for experienced furniture upholsterers and from $7 to $10 for less experienced upholsterers, according to limited data from union contracts. Employers generally pay inexperienced trainees the minimum wage. Upholsterers usually buy their own handtools.

Some upholsterers are members of the Upholsterers' International Union of North America.

7 out of 10 furniture upholsterers are self-employed.



SOURCE: Bureau of Labor Statistics

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Related Occupations
Other workers who combine manual skills and a knowledge of materials such as fabrics and wood to repair things are automobile upholsterers, fur cutters, furniture finishers, rug repairers, and shoe repairers.

Sources of Additional Information
For details about work opportunities for upholsterers in your area, contact local upholstery shops, the local office of the State employment service, or a local of the Upholsterers' International Union.

Hand Molders

(D.O.T. 518.361-010, -014, -018; and .484-010)

Nature of the Work
One of the oldest known methods of making metal products is casting—the process of pouring molten metal into a mold. When the metal cools and solidifies, it takes the shape of the mold. Metalcasting is one of the fastest, most economical, and most versatile ways to produce metal products. Metalcasting is done in foundries, which can be independent shops or departments of manufacturing plants. Molders are the skilled workers who prepare the molds used to cast metal.

There are several different ways of making the molds that are used in casting, but green sand molding is the most common because it is so economical. In green sand molding, molders pack and ram a specially prepared mixture of sand, clay, water, and other additives around a pattern of the object that is to be cast. The molding sand is contained in a box called a flask. The flask usually is made in two parts that can be separated to remove the pattern without damaging the mold cavity. When molten metal is poured into the cavity, it solidifies as it cools, and forms the casting.

Molders need good eye-hand coordination and manual dexterity.

Technologically advanced molding machines that pack and ram the sand mechanically are now used to make most molds. When only a small number of parts are to be cast, hand molders construct the sand molds. Power tools, such as pneumatic rammers and squeeze plates, and handtools, such as trowels and hand rammers, are used to compact the sand. Molds for small castings usually are made on the workbench; those for large and bulky castings are made on the foundry floor. An all-round hand molder can make many different types of molds. A less skilled molder may specialize in only a few simple types.

Other workers who have an important role in the metalcasting process are patternmakers. For a description of that job, see the statement elsewhere in this section.

Working Conditions
Working in a foundry can be hazardous. Molders must be careful to avoid burns from hot metal and to avoid cuts and bruises when handling metal parts, molds, and power tools. The use of safety equipment has helped reduce injuries.

Working conditions vary considerably. In many plants, improved ventilation systems and air-conditioning have greatly reduced the heat, fumes, and dust associated with this work; however, in some older foundries, these conditions may still exist.

Employment
Hand molders held about 9,100 jobs in 1982—about 1,700 fewer than in 1980. This decline in employment reflects the drop in manufacturing activity accompanying the 1981-82 recession. Most molders work in small foundry shops. Although molders work throughout the country, most are employed in the Great Lakes, Southern, and West Coast States.

Training, Other Qualifications, and Advancement
Hand molders usually learn their skills on the job. Workers usually do not need a high school diploma, although many employers prefer it.

Under close supervision from skilled molders, new workers begin with simple jobs, such as shoveling sand, and then gradually take on more difficult and responsible work, such as ramming molds and withdrawing patterns. As their training progresses, they learn to make complete molds. In addition, new workers may work in other foundry departments to develop all-round knowledge of foundry methods and practices. Although the length of training varies by individual and employer, most molders learn their trade in less than a year.

Physical standards for molding jobs are fairly demanding. Molders stand while working, must move about a great deal and must be able to use molding tools such as shovels and rammers. They need good eye-hand coordination and a high degree of manual dexterity to do accurate work.

Molders may advance to a specialized molding job or eventually to a supervisory position.

Job Outlook
Employment of hand molders is expected to grow more slowly than the average for all occupations through the mid-1990's. Much of the projected growth will stem from a return of employment to prerecession levels. Over the long run, demand for metal castings is expected to increase, but greater use of automatic machine molding and other laborsaving innovations will allow large increases in production with only a moderate increase in employment.

Some job openings will arise because of the need to replace experienced molders who transfer to other occupations, retire, or die. The number of openings, however, may fluctuate greatly from year to year because the demand for a number of products that use castings is sensitive to changes in the economy. Farm machinery and motor vehicles, for example, are products that use castings as components. When demand for these products slackens, as often happens during recessions, demand for metal castings also declines. Therefore, hand molders may experience layoffs or shortened workweeks when economic conditions are poor.

Earnings
In January 1982, average straight-time hourly earnings of hand molders ranged from $7.80 in nonferrous foundries to $9.60 in steel foundries, according to a survey by the National Foundry Association. In comparison, production workers in all manufacturing industries averaged $8.50 an hour. Molders who were paid on an incentive basis generally had higher earnings.

Related Occupations
Other workers who need a knowledge of metal characteristics, molding sand, and pouring procedures are molding-machine setters, moldmaker helpers, mold closers, and sand-slinger operators.

Sources of Additional Information
For details about training opportunities for molders, contact local foundries and the local office of your State employment service.

Career guidance material—free when requested on stationery with a school letterhead—is available from:

American Foundrymen's Society/Cast Metals Institute, Golf and Wolf Rds., Des Plaines, Ill. 60016.

Jewelers

(D.O.T. 700.281-010, -014, -022, and .381-030, -042, and -046)

Nature of the Work
For thousands of years, people have worn and admired jewelry made from precious metals and stones, such as gold and diamonds. Jewelers use such materials to make and repair rings, necklaces, bracelets, earrings, and other jewelry.

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Jewelers who work in jewelry stores and repair shops generally provide a variety of services to their customers. Much of their time is spent repairing jewelry. Typical repair jobs are enlarging or reducing rings, resetting stones, and replacing broken clasps and mountings. Some jewelers also may make jewelry by hand, repair watches, and do hand engraving. A small number are qualified gemologists and appraise the quality and value of diamonds and other gemstones.

Those who own stores or shops hire and train employees, order and sell merchandise, and handle other managerial duties.

Jewelers who work in jewelry factories generally only do one specialized job in the manufacturing process. For example, some make molds to cast jewelry or dies to stamp it. Others do finishing work, such as setting stones and engraving. However, a small number of the most highly skilled jewelers make entire jewelry pieces. Following their own designs or those created by designers, they shape the metal with pliers or other handtools or cast it in molds. They then solder individual parts to form the finished piece. They may carve designs in metal, and mount diamonds or other stones.

Jewelers use pliers, files, saws, hammers, torches, soldering irons, and a variety of other small handtools. They use chemicals and polishing compounds, such as jeweler's rouge, for soldering or finishing. Because the work is very detailed, jewelers often wear magnifying glasses.

Working Conditions

Jewelers usually work in comfortable surroundings, and the trade involves few physical hazards. However, doing delicate work while trying to satisfy demands for speed and quality from customers and employers can cause some stress.

Jewelry work requires intense concentration and good eye-hand coordination.

In stores and repair shops, jewelers generally work alone with little supervision. However, in retail stores they may talk with customers about repairs and even do some sales work.

Employment

Jewelers held about 30,000 jobs in 1982. About two-fifths of all jewelers are self-employed, operating jewelry stores or repair shops.

Most jewelers employed in precious jewelry manufacturing work in or near New York City. Although jewelry stores and repair shops are located throughout the country, most jobs in these establishments are in metropolitan areas.

Training, Other Qualifications, and Advancement

Jewelers' skills usually are learned through training on the job or in technical schools.

Technical school programs are the major source of training for people who want jobs in jewelry stores or repair shops. In these programs, which last from 6 months to 3 years, students learn the use and care of jewelers' tools and machines and basic jewelers' skills, such as casting, stone setting, polishing, and design. Some of these courses are very technical and cover topics like blueprint reading, math, and shop theory. Store and shop owners prefer graduates of these programs over people with no experience in the trade. However, most employers feel that graduates need an additional 3 years or more of supervised on-the-job training to refine their repair skills and to learn more about the operation of the store or shop. In addition, short-term courses such as sample making, wax carving, and gemology are available at some technical schools to help workers develop their skills.

In jewelry factories, manufacturers provide on-the-job training in jewelry-making skills for their production workers. Training can last for 3 to 4 years, depending on the difficulty of the skill. Training focuses on a particular specialty—casting, stone setting, or engraving.

A high school education has become very important for people entering the trade. A growing number of technical schools require a high school diploma or its equivalent for admission. Courses in art, mechanical drawing, and chemistry are useful, depending on which aspect of the trade one chooses to follow.

The precise and delicate nature of jewelry work requires finger and hand dexterity, good eye-hand coordination, patience, and concentration. Artistic ability is a major asset, because jewelry must be stylish and attractive.

In manufacturing, jewelers sometimes advance to supervisory jobs; however, advancement opportunities generally are limited. Jewelers who work in jewelry stores or repair shops may become salaried managers of jewelry stores; some open their own businesses.

A substantial financial investment is required to operate a jewelry store, because an inventory of expensive merchandise must be obtained. The jewelry business also is highly competitive. Jewelers who plan to open their own stores should have experience in selling.

Job Outlook

Employment of jewelers is expected to increase more slowly than the average for all ocupations through the mid-1990's. However, some new jobs will arise from growth in demand for jewelers, and additional job openings will result from the need to replace experienced jewelers who transfer to other occupations, retire, or leave the labor force for other reasons. Overall, the job outlook will be best in jewelry stores.

Demand for jewelry repair will increase as rising prices of gold and gems make old jewelry more valuable. As more store owners offer jewelry repair service to meet this increased demand, job opportunities for jewelry repairers are expected to increase. These jewelers should enjoy steady work even during economic downturns because the demand for jewelry repair is less sensitive to economic conditions than the demand for new jewelry.

Job opportunities for jewelers in factories depend on the sales of jewelry. When inflation and recession force people to spend less on luxuries such as jewelry, job opportunities in jewelry factories may decline.

Busy store and shop owners often are reluctant to hire untrained and inexperienced workers. People entering the trade may have trouble finding a job unless they can demonstrate their ability. Such persons can improve their chances for employment by attending a technical school with a good reputation among local store or shop owners.

Earnings

Median weekly earnings of full-time jewelers were about $280 in 1982. The middle 50 percent earned between $230 and $360. The bottom 10 percent earned less than $180 and the top 10 percent earned more than $445. Earnings of experienced, unionized jewelry workers in manufacturing ranged from about $6.50 to $9 an hour, according to the limited information available. New workers in jewelry factories received about $4 an hour to start. New workers receive periodic raises up to the minimum union wage for their job.

In some precious jewelry factories, the workweek is 35 hours. Most jewelers in stores and repair shops work 40 to 48 hours a week. During peak sales seasons, such as Christmas, they often work over 50 hours a week. However, during slack periods, they may face layoff or a shortened workweek.

Related Occupations

Jewelers are important craft workers in the jewelry industry. Other skilled workers in this industry include gem cutters, gemologists, hand engravers, model makers, and watch repairers.

Sources of Additional Information

For information on job opportunities in jewelry stores, contact:

Jewelers of America, Time-Life Building, Suite 650, 1271 Avenue of the Americas, New York, N.Y. 10020.

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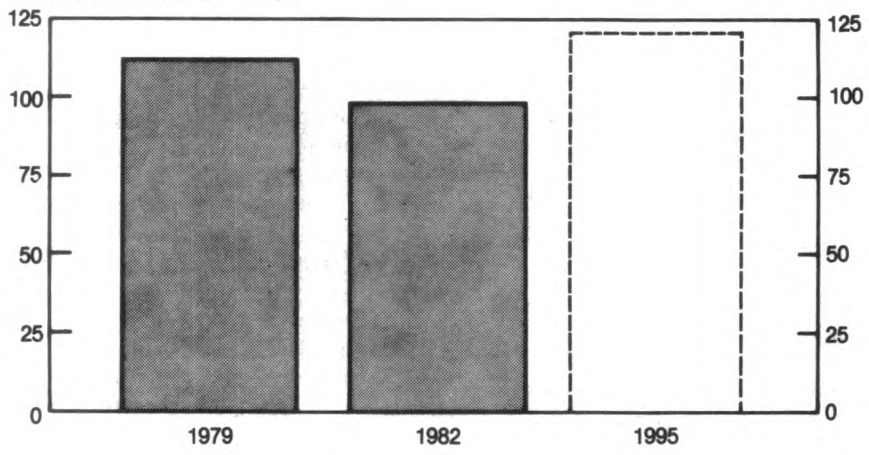
Job-and-Die Setters

(D.O.T. 518.380-010; 556.380-010; 600.360-010, .380-014, -022; 603.280-034, .360-010, .380-010; 604.360-010; 609.280-010, .380-014; 612.360-010; 615.280-010, .380-010; 616.260-018, .360-022, .380-010; and 619.380-014)

By 1995, employment of job-and-die setters is expected to be only slightly higher than the pre-recession level.



SOURCE: Bureau of Labor Statistics

Nature of Work

Machine tools used in shops that do machining in large volume often are both very large and very complex. Job-and-die setters, often called machine tool setters, specialize in preparing these tools to operate efficiently. Most setters work on only one type of machine, such as a drill press or lathe. However, some set up several different machines.

Before they begin preparing a machine for use, setters consult blueprints, written specifications, or job layouts. From these, they can determine how fast the material can be fed into the machine, operating speeds, and the order in which the machine will perform its operations. They then select and install the proper cutting tools and adjust guides, stops, and other controls to insure that the machine will repeat its cycle accurately.

After setting up the machine, they usually make a trial run to be sure that it is running smoothly and producing parts that conform to specifications. When they are sure the machine is functioning properly, they explain to the machine operator how to run the machine and how to be sure that the output meets specifications. They then turn the machine over to the operators to begin production.

Working Conditions

Generally, working conditions are good for these workers. While conditions vary, most machine shops are clean, well lighted, and well ventilated. Serious work accidents are not common, but machine tools and flying metal particles may cause finger, hand, and eye injuries. To prevent accidents, setters must wear safety glasses and other protective devices. In shops where noise is a problem, setup workers must wear earmuffs or earplugs to protect their hearing.

Job-and die-setters encounter some dangers that other machining workers do not. Die setters, for example, may have to place their hands inside a press when they are preparing the machine for use. A machine tool operator could not do this as the guard rails would be in place.

Job-and-die setters check to see that finished pieces meet design specifications.

Employment

Job-and-die setters held about 95,000 jobs in 1982, 11,000 fewer than in 1980. This decline in employment reflects the slump in manufacturing activity during the 1981-82 recession. The distribution of employment among specific setter occupations is presented in the following tabulation:

	Percent
Total	100.0
Metal machine tool setters	57.9
Metal punch press setters	21.3
Plastic molding machine setters	8.2
Shear and/or slitter setters	6.6
Other job-and-die setter occupations	5.9

Most job-and-die setters work for large manufacturing firms that make automobiles, aircraft, machinery, and fabricated metal products. Few, if any, are found in maintenance shops or in small jobbing shops. Although job-and-die setters are employed throughout the country, jobs are most plentiful in large metropolitan areas where most large factories are located.

Training, Other Qualifications, and Advancement

Job-and-die setters learn the trade on the job. Frequently, setter jobs are filled in-house by experienced machine tool operators. Working under the supervision of experienced setters, trainees learn to set up one or more kinds of machine tools and select the sequence of operations so that metal parts will be made according to specifications. Although the length of training varies with the number and complexity of machine tools being used, training seldom takes more than a few weeks.

Employers prefer to hire high school graduates. Courses in shop, shop math, blueprint reading, and drafting are useful. Experience in working with machine tools can improve chances of getting a job. The ability to communicate clearly is important in explaining the machining operations to machine tool operators.

Job-and-die setters may advance to supervisory jobs. They also can transfer into trainee jobs for skilled machining occupations such as machinist, and toolmaker and diemaker.

Job Outlook

Employment of job-and-die setters is expected to increase about as fast as the average for all occupations through the mid-1990's. Most of this projected growth reflects a return of employment to prerecession levels. Although consumer and industrial demand for machined goods will grow, partly offsetting this will be greater productivity of setters due to the increasing use of numerically controlled machined tools. In these machine tools, operating sequences, feed speeds, tool selection, and other functions are controlled by a computer. Most job opportunities will arise from the need to replace experienced workers who transfer to other occupations, retire, or leave the labor force for other reasons.

Employment of job-and-die setters will fluctuate from year to year because this occupation is somewhat sensitive to changes in the economy. A drop in demand for automobiles, aircraft, machinery, or other products that have

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machined metal parts lessens the need for setters and may result in layoffs or shortened workweeks.

Earnings

Median weekly earnings for job-and-die setters were $360 in 1982. Most earned between $280 and $430 a week. The top 10 percent earned over $495, and the bottom 10 percent earned less than $225 a week.

In 1982, hourly earnings for setters in metropolitan areas ranged from $8.50 to $12.10. In comparison, the average rate for all production workers in private industry, except farming, was $7.67 an hour.

Many job-and-die setters are members of unions, including the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; and the United Steelworkers of America.

Related Occupations

The occupations most closely related to job-and-die setter are, of course, the other machining occupations. These include machinists, instrument makers, machine tool operators, and toolmaker and diemakers.

Other occupations that require precision and skill in working with metal include arc cutters, blacksmiths, gunsmiths, locksmiths, metal patternmakers (metal), and welders.

Sources of Additional Information

For information about work opportunities in this occupation contact the nearest office of the State employment service.

For general information about this occupation, contact:

The National Machine Tool Builders, 7901 Westpark Dr., McLean, Va. 22102.

The National Tooling and Machining Association, 9300 Livingston Rd., Ft. Washington, Md. 20744.

The National Screw Machine Products Association, 6700 W. Snowville Rd., Breckville, Ohio 44141.

The International Association of Machinists and Aerospace Workers, 1300 Connecticut Ave. NW., Washington, D.C. 20036.

Lithographers and Photoengravers

(D.O.T. 970.361-014; 971.261-010, .381-014 through -034 and -050, .382-014 and -018, .684-010, .685-010; 972.281-010, .282-010, .381-010, -014, -033, -026; and .979.381-018)

Nature of the Work

Lithography, also called offset printing, is the dominant method of printing. In this process, lithographers photograph the material to be printed and make a printing plate from the film which, when inked, is pressed against a rubber-covered roller to transfer the ink onto the paper.

In photoengraving, a similar process, photoengravers produce metal plates or gravure cylinders for reproduction of copy. Although lithography is replacing photoengraving for many purposes, photoengraving is still used. Technological advances in producing plates by means of lasers will help to maintain the importance of this printing process.

Lithographers and photoengravers are responsible for a variety of printing activities ranging from photographing copy and pictures to making the final printing plates. In small shops, the lithographer or the photoengraver may be responsible for all of the steps in the printing process. Most lithographers specialize in one occupation, such as camera operator, artist, stripper, or platemaker.

Camera operators start the process of making a lithographic plate by photographing and developing negatives of the material. They generally are classified as line camera operators, halftone operators, or color separation photographers. Negatives may need retouching to lighten or darken certain parts. *Lithographic artists* make these corrections by sharpening or reshaping images on the negatives. They do the work by hand, using chemicals, dyes, and special tools. Lithographic artists must know the characteristics of all types of paper and must produce fine shades of color. Like camera operators, they are usually assigned to only one phase of the work, and may have job titles such as dot etchers, retouchers, or letterers.

Assemblers cut the film to required size and arrange and paste the negatives onto layout sheets, which are used by platemakers to make press plates. *Platemakers* cover the surface of flat pieces of metal with a coating of photosensitive chemicals, or may use plates with the coating already applied. They then put the layout sheet on top of the plate and expose both to bright lights. As the final step, platemakers treat the plate with chemicals to bring out the images of the material to be printed. In a growing number of printing plants, lithographic platemakers use machines which automatically process the plates. This new equipment places more emphasis on technical skills than craft skills. The platemaker operates and maintains the machine and insures that plates meet quality standards. When a large number of plates or multiple images are needed, operators use a step-and-repeat machine.

Working Conditions

Although lithographers and photoengravers stand most of the time, the work is not physically demanding. Lithographic artists and assemblers may find working with fine detail tiring and fatiguing to the eyes. Platemakers in both processes working with toxic chemicals may be exposed to skin irritations. Work areas usually are well lighted and air-conditioned.

Lithographers and photoengravers generally work a regular 7-or 8-hour day but sometimes have to work overtime to meet publication deadlines. Some lithographers and photoengravers—particularly those who work for newspapers—work night shifts, weekends, and holidays.

Employment

Lithographers and photoengravers held 67,000 jobs in 1982. Most jobs are in commercial printing plants, newspapers, and printing trade service establishments. Many photoengravers have their own shops.

Although these workers are located in all parts of the country, most are employed in large printing centers such as New York, Chicago, and Los Angeles.

Photography is used in lithography and photoengraving.

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Training, Other Qualifications, and Advancement

Many lithographers, and some photoengravers, learn the trade through on-the-job training. They work as helpers and are taught by experienced craft workers. Years of on-the-job training are required in order to become a skilled worker.

Apprenticeship provides another way of becoming a skilled worker, although few apprenticeships in photoengraving have been offered in recent years. Apprenticeship programs may emphasize a specific craft, such as camera operator or lithographic artist, etcher, finisher, or proofer but the apprentice is introduced to all phases of the operation.

Usually, applicants for training must be high school graduates, at least 18 years of age, and in good physical condition. A knowledge of color composition is an asset, as is evidence of an aptitude for mastering the computer-assisted equipment used in graphic preparatory processes. Camera operators should have an understanding of chemistry, optics, and the entire offset and photographic process. Precision, patience, good eyesight, and artistic skills are important qualifications for lithographic artists and assemblers.

Vocational-technical institutes, community and junior colleges, and 4-year colleges offer 2-year programs in printing technology which provide a valuable background for persons interested in learning lithographic crafts. High school and vocational school training in printing, photography, mathematics, chemistry, physics, mechanical drawing, and art also is helpful.

Job Outlook

Employment of lithographers is expected to rise faster than the average for all occupations through the mid-1990's in response to widespread use of offset printing, while employment of photoengravers is expected to decline. These divergent trends reflect the fact that offset printing methods—which require lithographers—are replacing letterpress printing, which requires photoengravers' skills. Also contributing to the rapid employment growth projected for lithographic workers is the trend toward greatly increased use of color in print materials, such as newspaper advertising inserts.

Most openings, however, will result from the need to replace experienced workers who leave the occupation.

Employment opportunities should be best for people who have completed postsecondary programs in printing technology. Many employers prefer to hire applicants who have completed these programs because the comprehensive training they receive helps them learn lithography and adapt more rapidly to new processes and techniques.

Earnings

The basic wage rate for a lithographer or photoengraver depends on the job and location. In early 1983, basic wage rates for photoengravers ranged from $10.86 to $18.00 an hour. A lithographer operating a color stripper earned from $7.14 to $16.41 an hour, while a lithographer operating a scanner earned from $9.83 to $18.47. This information is based on limited data from contracts.

Related Occupations

Lithographers and photoengravers use artistic skills in their work. Artistic skills are also essential for occupations such as sign painters, jewelers, decorators, and engravers.

Sources of Additional Information

Details on apprenticeship and other training opportunities in lithography and photoengraving are available from local employers such as newspapers and printing shops, local offices of the Graphic Communications International Union, or the local office of the State employment service. For information on schools that offer courses in printing technology, write to:

Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

For general information on lithographic occupations, write to:

Graphic Communications International Union, 1900 L St. NW., Washington, D.C. 20036.

Printing Industries of America, Inc., 1730 N. Lynn St., Arlington, Va. 22209.

Machinists and Layout Markers

(D.O.T. 600.260-018, .280-022, -026, -030, -034, -038, -042, .281-010, -018, .380-010, .381-010; 609.380-010; and 714.281-018)

Nature of the Work

Machinists are skilled metalworkers who can turn pieces of metal into intricate products, such as gears or pistons, that meet precise specifications. They know how to set up and operate most types of machine tools used to make metal parts for aircraft, cars, machine tools, and other equipment. They also know the working properties of metals such as steel, cast iron, aluminum, and brass used to make these parts. Using this knowledge of metals plus their skill with machine tools, machinists plan and carry out the operations needed to make machined products. Layout markers, who have skills similar to machinists, specialize in planning the machining, welding, and assembling operations.

Before they begin work on a product, machinists review blueprints or written specifications. They select tools and materials for the job and plan the sequence of cutting and finishing operations. After selecting materials and the appropriate machine, they make the required computations. For example, they must calculate where to cut or bore into the workpiece, how fast to feed the metal into the machine, and how much metal to remove. They then mark the metal stock to show where these cuts should be made.

After this layout work is completed, machinists perform the necessary machining operation. They position the metal stock on the machine tool, set the controls, and make the cuts. They use precision instruments, such as micrometers, to make sure their work meets specifications. Machined parts may have to meet tolerances to thousandths or even ten-thousandths of an inch. After completing the machining operations, machinists finish and assemble the pieces.

Some machinists do maintenance work, repairing or making new parts for machinery. They also adjust and test these parts.

Working Conditions

Most machine shops are clean, well-lighted, and well-ventilated. Many modern shops are air-conditioned. Working around high-speed machine tools, however, presents certain dangers, and workers must follow safety practices. Since flying pieces of hot metal can cause burns and cuts, machinists must wear safety glasses with side shields and other protective devices. Workers also may wear earmuffs or earplugs to protect their hearing because machine shops can be noisy.

Employment

Machinists and layout markers held 236,000 jobs in 1982, about 18,000 fewer than in 1980—reflecting the drop in manufacturing activity during the 1981-82 recession.

Most machinists work in industries that manufacture automobiles, aircraft, metalworking machinery, primary metals, and fabricated metal products. Other industries employing substantial numbers of these workers are the railroad, chemical, food processing, and textile industries. The Federal Government also employs machinists in Navy yards and other installations.

Although machinists work in all parts of the country, jobs are most plentiful in metropolitan areas where most factories are located.

Skilled machinists often work with little supervision.

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Training, Other Qualifications, and Advancement

A 4-year formal apprenticeship is the best way to learn the machinist trade. Some machinists do learn this trade informally on the job, however. Typical machinist apprentice programs consist of approximately 8,000 hours of shop training and about 570 hours of related classroom instruction. In shop training, apprentices learn chipping, filing, handtapping, dowel fitting, riveting, and the operation of various machine tools. In the classroom, they study blueprint reading, mechanical drawing, shop mathematics, and shop practices. Nonapprentice training involves similar but less structured on-the-job training without any classroom instruction.

Persons interested in becoming machinists should be mechanically inclined in order to use the tools and machines required to build complex parts. They also should be temperamentally suited to do highly accurate work that requires concentration as well as physical effort. Prospective machinists should be able to work independently.

A high school or vocational school education, including mathematics, physics, drafting, blueprint reading, or machine shop training, is desirable. Experience with machine tools also is helpful. In fact, many of the people who enter the occupation have previously worked as machine tool operators or job-and-die setters.

Some companies require experienced machinists to take additional courses in mathematics and electronics at company expense in order to learn newer metalworking technologies, such as numerically controlled machine tools. In addition, equipment builders generally provide training in the electrical, hydraulic, and mechanical aspects of new machine tools.

Machinists may become supervisors. Others take additional training and become tool-and-die or instrument makers. Skilled machinists may open their own shops or advance into other technical jobs such as tool programming.

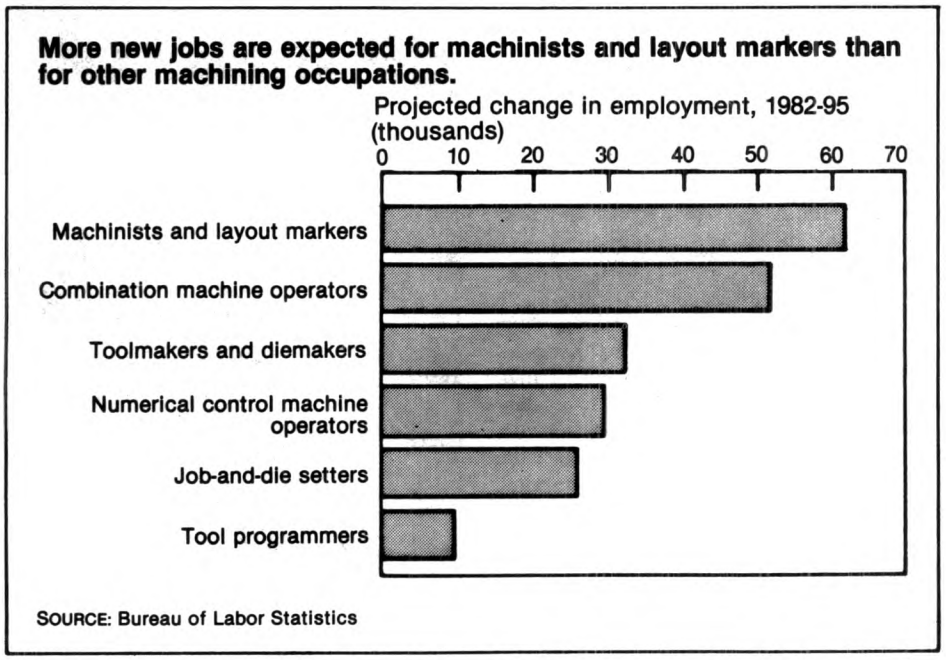
Job Outlook

Employment of machinists and layout markers is expected to increase about as fast as the average for all occupations through the mid-1990's. Some of this projected growth reflects a return of employment to prerecession levels. In addition, many openings will arise from the need to replace experienced machinists who transfer to other fields of work, retire, or die. Although the proportion of machinists who leave the occupation each year is somewhat lower than that for all craft workers, replacement needs will account for most job openings.

As population and incomes rise, so will the demand for goods that have machined parts, such as automobiles, household appliances, and industrial products. As industries continue to use a greater volume of complex machinery and equipment, proper maintenance will become increasingly important and more skilled maintenance machinists will be needed to prevent costly breakdowns in highly mechanized plants. Often the breakdown of just one machine can stop an entire production line for hours. However, technological developments that increase the productivity of machinists are expected to keep employment from rising as fast as the demand for machined parts. Chief among these innovations are computer controlled machine tools that significantly reduce the time for machining operations.

Because training programs generally last several years, temporary shortages of skilled machinists may develop in areas where demand for machined goods rises sharply. When this occurs, employers often use overtime to meet production goals. Large employers may offer higher wages to attract workers.

Employment of machinists fluctuates with economic conditions. When demand for machined goods falls, machinists involved in production may be laid off or be forced to work fewer hours. Employment of machinists involved in plant maintenance is more stable because proper maintenance and repair of costly equipment remain vital concerns even when production levels fall.



Earnings

In 1982, median weekly earnings for machinists were about $370. Most earned between $290 and $455. Ten percent of all machinists had median weekly earnings of less than $255, while the 10 percent with the highest earnings made more than $550 a week.

The earnings of machinists compare favorably with those of other skilled workers. Machinists employed in metropolitan areas had estimated average hourly earnings of $11.55 in 1982. In comparison the average hourly rate for all production workers in private industry, except farming, was $7.67.

Average hourly rates in 10 areas selected to show how rates differ in various parts of the country, appear in the accompanying table. Because machinists' work is not seasonal, earnings are relatively stable year round. Machinists also have numerous opportunities for overtime work when demand for machined parts is high.

Table 1. Average hourly earnings of machinists in selected areas, 1982

Area	Hourly rate
San Francisco-Oakland	$13.86
Gary-Hammond-East Chicago	13.69
Corpus Christi	13.29
Portland, Oreg.-Wash.	12.98
Milwaukee	12.89
Atlanta	12.34
Trenton	9.33
Northeast, Pa.	9.04
Norfolk-Virginia Beach	8.92
Jackson, Miss.	8.81
Providence-Worwick-Pawtucket	8.37
Greenville-Spartanburg	7.92

SOURCE: Bureau of Labor Statistics.

Many machinists are members of unions, including the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the International Union of Electrical, Radio and Machine Workers; the International Brotherhood of Electrical Workers; and the United Steelworkers of America.

Related Occupations

Occupations most closely related to machinists are, of course, the other machining occupations. These include toolmakers and diemakers, machine tool operators, job-and-die setters and instrument makers. Other occupations that require precision and skill in working with metal include arc cutters, blacksmiths, gunsmiths, locksmiths, metal patternmakers, and welders.

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Sources of Additional Information

For information about machinist apprenticeships or other work opportunities in this trade, contact local machine shops, a local of one of the unions mentioned above, or the nearest office of the State employment service or State apprenticeship agency.

For general information about this occupation, contact:

The National Machine Tool Builders, 7901 Westpark Dr., McLean, Va. 22102.

The National Tooling and Machining Association, 9300 Livingston Rd., Ft. Washington, Md. 20744.

The National Screw Machine Products Association, 6700 W. Snowville Rd., Breckville, Ohio 44141.

The International Association of Machinists and Aerospace Workers, 1300 Connecticut Ave. NW., Washington, D.C. 20036.

Patternmakers

(D.O.T. 600.280-046, -050; 661.281-018, -022; 693.281-014, -018, -022, and .382-010)

Nature of the Work

Automobiles, planes, ships, industrial machinery, and other products have parts that are metal castings. Metalcasting is a process by which detailed metal products are formed when molten metal is poured into molds and allowed to solidify in the mold cavity. The hollow mold cavity is formed around a pattern—a model of the part to be cast. The patternmaker's skill determines the quality of the pattern and, ultimately, of the metal casting.

Patterns are made from many different materials—metal, wood, plastic, and even wax. Patternmakers may specialize in making patterns from one material or may work with a variety of materials.

Regardless of the material used, patternmakers work from drawings that describe the finished cast object. If the pattern is to be made from metal or wood, patternmakers lay out and cut pieces for the pattern from metal or wood stock. They then finish and assemble the pieces into the complete pattern. In some cases, the patternmaker first makes a wood pattern and then uses it to make a mold in which a metal pattern is cast.

To cut and finish metal pieces, patternmakers use metalworking machines such as lathes, drill presses, milling machines, and grinders. For wood patterns, they use wood lathes, sanders, and other power woodworking tools. For both wood and metal patterns, they use small handtools for finishing and assembling.

Other workers who have an important role in the metal casting process are hand molders. For a description of that job, see the statement elsewhere in this section.

Working Conditions

Patternmakers work indoors in well-lighted, well-ventilated areas. The rooms in which they work generally are separated from the areas where the casting takes place, so they are not exposed to the heat and noise of the foundry floor. Although the work is not strenuous, patternmaking requires considerable standing and moving about.

Employment

Metal and wood patternmakers held about 13,000 jobs in 1982—about 3,000 fewer jobs than in 1980. This decline reflects the drop in manufacturing employment during the 1981-82 recession. Most patternmakers work for firms that produce metal castings on a contract basis or manufacturing firms that make industrial equipment, cars, and aircraft. Some work for firms that make patterns on a contract basis.

Training, Other Qualifications, and Advancement

Apprenticeship is the best way to learn the trade. The high degree of skill and the wide range of knowledge needed for patternmaking make it difficult to learn the trade on the job. However, skilled machinists are able to transfer into metal patternmaking if they acquire additional on-the-job training or experience.

Apprenticeship programs generally are sponsored jointly by the employer and the International Molders' and Allied Workers' Union. The usual apprenticeship period for patternmaking is 4 or 5 years. At least 144 hours of classroom instruction generally accompany the work experience provided each year. Apprentices begin by helping experienced patternmakers in routine duties. They make simple patterns under close supervision; as they progress, the work becomes increasingly complex and the supervision more general. Employers almost always require apprentices to have a high school education.

High school courses in mechanical drawing, blueprint reading, woodworking, metalworking, and shop mathematics are helpful to persons interested in becoming a patternmaker. In addition, vocational and technical school training in patternmaking, metalworking, and machining provide useful preparation, and may be credited toward completion of the apprenticeship. Manual dexterity and attention to detail are especially important because of the precise nature of the work. The ability to visualize objects in three dimensions also is important when reading work drawings.

Patternmakers earn higher pay as their skill increases, and some become supervisors.

Job Outlook

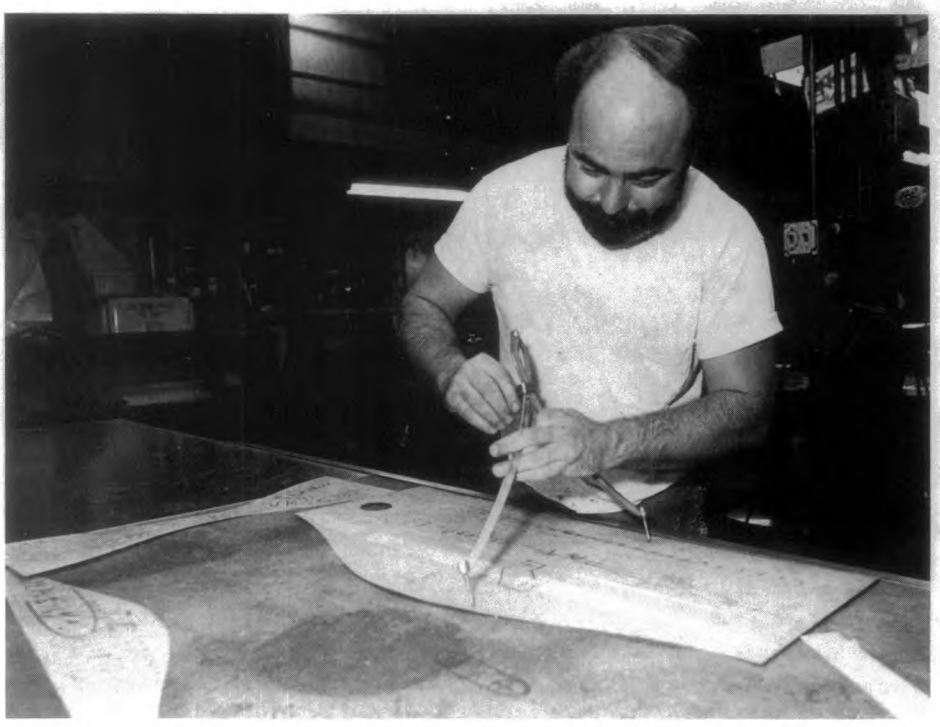
Employment of patternmakers is expected to grow more slowly than the average for all occupations through the mid-1990's. Most of the projected growth reflects a return of employment to prerecession levels.

Over the long run, only a moderate rise in demand for patternmakers is expected despite anticipated increases in demand for metal castings. Improvements in metal casting technology, such as the greater use of metal and plastic patterns will allow production to increase faster than employment. Because metal and plastic patterns last longer than wooden ones, fewer patterns have to be made. Most job openings will arise because of the need to replace experienced patternmakers who transfer to other occupations, retire, or die.

The number of job opportunities may fluctuate from year to year since the demand for metal castings is sensitive to changes in the economy. When economic conditions are poor, the demand for durable goods that use metal casting is reduced. Thus, patternmakers may experience layoffs or shortened workweeks when users of metal castings face a reduction in the demand for their products.

Earnings

Patternmakers generally have higher earnings than other production workers in manufacturing. In January 1982, average straight-time



Patternmakers must visualize the object in three dimensions when reading blueprints.

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hourly earnings of patternmakers ranged from $10.20 in nonferrous foundries to $10.80 in steel foundries, according to a survey by the National Foundry Association. In comparison, all production workers in manufacturing industries averaged $8.50 an hour.

Related Occupations

Other workers who follow blueprints and work drawings to construct full-sized and scale models of products include sample-body builders, model makers, form builders, mock-up builders, wood model makers, cabinetmakers, and metal fabricators.

Sources of Additional Information

For details about training opportunities for patternmakers, contact local foundries, the local office of your State employment service, or the nearest office of the State apprenticeship agency.

Career guidance material—free when requested on stationery with a school letterhead—is available from:

American Foundrymen's Society/Cast Metals Institute, Golf and Wolf Rds., Des Plaines, Ill. 60016.

Photographic Process Workers

(D.O.T. 962.665-010; 970.281-010; -018, .381-010, -030 -034; 972.281-010, -018, 976.267-010 through .361-010, .381-014 through .564-010, .665-010 through .685-030, .687-014 through -022; and 979.682-014)

Nature of the Work

If the developing of film and printing of pictures were left to the average photographer, few photographs would be taken. Instead, professionals and amateurs alike generally rely on photographic process workers in photo finishing or custom photo labs to develop film, make prints and slides, and do related tasks such as enlarging and retouching photographs. (This statement does not discuss employees of laboratories that specialize in processing professional motion picture film).

Photo process workers develop film, make prints and slides, and enlarge and retouch photographs.

All-round darkroom technicians can do everything necessary to develop and print film. They vary the developing process according to the type of film—black-and-white negative, color negative, or color positive. For example, a developing process for black-and-white negative film covers five steps: Developer, stop bath, fixing bath, washing, and drying. The first three steps use chemical solutions and are performed in darkness. In a hand operation, the technician first immerses unwound film in the developer to bring out the image on exposed film. After a specified period, the technician transfers the film to a stop bath to prevent overdevelopment. Next, the film is placed in a fixing bath that makes it insensitive to light to prevent further exposure. Finally, the technician washes the film with water to remove the fixing solution and places the film in a drying cabinet. Although processing is done by hand in some small photographic studios, technicians in many photographic labs operate machines that automatically perform the steps described above.

Processing of color film is more complex than processing of black-and-white film. Thus, some labs employ *color-laboratory technicians* (D.O.T. 976.681-010)—highly skilled workers who specialize in processing color film.

The darkroom technician makes a photograph by transferring the image from a negative to photographic paper. Printing frequently is performed on a projection printer, which consists of a fixture for holding negatives and photographic paper, an electric lamp, and a magnifying lens. The technician places the negative between the lamp and lens, and the paper below the lens. When the technician turns on the lamp, light passes through the negative and lens and records a magnified image of the negative on the paper. During printing, the technician may vary the contrast of the image or remove unwanted background by using paper patterns to shade part of the photographic paper from the projected image. After removing the exposed photographic paper from the printer, the technician develops it in much the same way as the negative. If the customer desires, the technician mounts the finished print in a frame or on a paper or cardboard back.

In addition to working in the laboratory, darkroom technicians may set up lights and cameras or otherwise assist experienced photographers. Many technicians, particularly those in portrait studios who aspire to become professional photographers, divide their time between taking and processing pictures. In some labs, helpers assist technicians. Technicians also may be assisted by workers who specialize in a particular activity, such as *developers* (D.O.T. 976.681-010), *print washers* (D.O.T. 976.684-022), *projection printers* (D.O.T. 976.381-018), and *photograph retouchers* (D.O.T. 970.281-018).

In most large photo labs where film developing is largely automated, darkroom technicians supervise workers whose assignments require only a limited knowledge of developing and printing. Included are *photofinishing laboratory workers* (D.O.T. 976.687-018), who sort film according to the type of processing needed and number each roll for identification; *color-printer operators* (D.O.T. 976.382-014), who control the equipment used to produce color prints from negatives; *print controllers* (D.O.T. 976.685-010), who operate machines that expose rolls of photographic paper to negatives; *automatic print developers* (D.O.T. 976.685-026), who operate machines that develop rolls of exposed photographic paper; *cutters* (D.O.T. 976.685-010), who tend machines that cut processed film or prints into single or multiple units; *automatic mounters* (D.O.T. 976.685-022), who tend the automatic mounting presses that cut film into individual transparencies and seal them in mounting frames; and *photo checkers and assemblers* (D.O.T. 976.687-014), who inspect and package finished slides and prints for customers.

Working Conditions

Photo lab jobs are not physically strenuous and the work is done in clean, well-lighted, and air-conditioned photofinishing laboratories. However, many workers, especially in large laboratories, do repetitious work at a rapid pace. Some workers such as photo checkers and assemblers, who perform detailed tasks, are subject to eye fatigue.

Most photo lab employees work a 40-hour week. In labs that specialize in processing film for amateur photographers, employees may work a considerable amount of overtime, at premium pay, during peak seasons such as summer and after Christmas.

Employment

Photo process workers held about 67,000 jobs in 1982. About half worked in large photofinishing labs that process film for amateur and professional photographers. Many others worked in photo labs operated by portrait and commercial studios and with motion picture producers, photo equipment manufacturers, and other organizations. Darkroom technicians also work in commercial labs that specialize in processing the work of professional photographers.

Photo process workers are employed in all parts of the country but are concentrated in the more populous areas such as New York, Los Angeles, Chicago, and other large cities.

About 3 out of 10 entrants to this occupation work part time.

Training, Other Qualifications, and Advancement

Most photo process workers learn their skills through informal on-the-job training. Beginners start as helpers and gradually learn to develop and print film by assisting experienced technicians. It generally takes about 3 years to become a fully qualified darkroom technician.

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Some helpers specialize in a particular activity, such as printing or developing. Generally, less training time is required to become a specialist than to become an all-round darkroom technician.

When hiring darkroom technician helpers, employers prefer applicants who are high school graduates. Courses in chemistry and mathematics are helpful to people interested in this field. Some high schools and trade schools offer courses in photography that include training in film processing. The Armed Forces also offer training in photographic processing. Experience gained through processing film as a hobby is helpful.

Several community colleges offer 2-year programs leading to an associate degree in photographic technology. Formal training also is available from vocational schools and technical institutes. Completion of postsecondary courses in this field is helpful to people who are interested in supervisory and managerial jobs in photo labs.

Some darkroom technicians eventually become professional photographers. (See the statement on photographers elsewhere in the *Handbook*). Others advance to supervisory positions in laboratories.

On-the-job training for workers in specialized photo process occupations ranges from a few weeks for film numberers and automatic mounters, for example, to several months for photo checkers and assemblers. For many jobs, manual dexterity, good vision, including normal color perception, and good hand-eye coordination are important qualifications.

Job Outlook

Employment of photo process workers is expected to increase more slowly than average through the mid-1990's. Increased demand will create some jobs, but most openings will result from replacement needs. Job prospects for photo process workers are associated to some extent with fluctuations in the business cycle; these workers are subject to layoff during economic downturns, when the volume of film processing declines.

The demand for film processing is expected to rise as a result of the expanding interest in amateur photography—spurred by rising population and personal income as well as improvements in still and movie cameras that make them easier to load and operate. Business and government also are expected to contribute to the demand for film processing through expanded use of photography in research and development activities and increased use of photographs to illustrate printed materials. Employment of photographic process workers is not expected to keep pace with the demand for film processing, however, because of the growing popularity of self-processing instant cameras and the automation of photo lab operations.

Earnings

Earnings of photo process workers vary greatly depending on skill level, experience, and geographic location. The median earnings for full time photo process workers in 1982 were about $245 a week. The middle 50 percent earned between about $187 and $309 a week. The lowest tenth earned less than $166 a week, the highest tenth, more than $452.

Related Occupations

The more highly skilled photo process workers—all-round darkroom technicians and color-laboratory technicians, for example—need a specialized knowledge of the photodeveloping process. Other laboratory workers who apply specialized technical knowledge include chemical laboratory technicians, crime lab analysts, food testers, medical laboratory assistants, metallurgical technicians, and quality control technicians.

Sources of Additional Information

For information about employment opportunities in photographic laboratories and schools that offer degrees in photographic technology, write to:

Photo Marketing Association International, 3000 Picture Place, Jackson, Mich. 49201.

Shoe Repair Occupations

(D.O.T. 365.361-014, 753.684-026, and 788.381-010)

Nature of the Work

People like their shoes to look nice and feel comfortable. Keeping them that way is the job of the shoe repairer. Using their knowledge of shoe construction and leatherworking, shoe repairers give worn shoes a new lease on life.

Replacing soles and heels is the most common type of shoe repair. Repairers place the shoe on a last, a block shaped like a foot. They remove the old sole and heel with a knife and pincers. To prepare the shoe for the new sole, repairers rough the shoe's bottom by holding it against a sanding wheel. Repairers then cement to the shoe a piece of leather or rubber that will be the new sole. They hammer the new sole so it adheres to the shoe, and cement or stitch it in place. To form the new sole, repairers cut off the excess material with a trimming machine and smooth the edge against a sanding wheel. To reheel the shoe, repairers select a precut replacement heel or cut one to shape and cement and nail it in place. New soles and heels are stained and buffed to match the color of the shoe. Tennis and running shoes are repaired in much the same manner—the old sole is cut off and a new one cemented in place. Then the leather or canvas uppers are reconditioned and missing eyelets are replaced.

Shoe repairers also replace insoles, restitch loose seams, and restyle old shoes by changing heels or dyeing uppers. Highly skilled repairers may design, make, or repair orthopedic shoes according to doctors' prescriptions. Repairers also may mend handbags, luggage, tents, and other items made of leather, rubber, or canvas. They also replace zippers, dye handbags, and stretch shoes to conform to the foot.

In large shops, repair work sometimes is divided into a number of specialized tasks. For example, some of the repairers only remove and replace heels and soles; others only restitch torn seams.

Shoe repairers use a variety of power-operated equipment, such as sole-stitchers, heel-nailing machines, and sewing machines. Among the handtools they use are hammers, knives, awls, nippers, and skivers (a special tool for splitting pieces of leather).

Self-employed shoe repairers have managerial responsibilities in addition to their regular duties. They have to maintain good relations with their customers; decide whether to sell items such as shoe polish and leather goods; keep business records; and supervise other repairers, helpers, and cashiers.

Job prospects are good for people with some training in shoe repair.

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Working Conditions

Because many shoe repairers own shops, working conditions often are determined by the repairer. Some shops may be crowded and noisy and have poor lighting or ventilation. Strong odors from leather goods, dyes, and stains often are present. The work is not strenuous and hazards are few if safety precautions are followed. However, stamina is needed because repairers must stand much of the time.

Employment

Shoe repairers held about 16,000 jobs in 1982. More than half of all jobs are in small, one-person repair shops. Large shoe repair shops and those operated by shoe stores, department stores, and drycleaning establishments provide most of the remaining jobs. Shoe manufacturing firms employ a small number of repairers to fix shoes damaged in production; these workers generally are less skilled than those who work in repair shops.

Training, Other Qualifications, and Advancement

Shoe repairers generally learn their trade on the job as helpers to experienced repairers, although some learn in vocational programs. Helpers begin by assisting experienced repairers with simple tasks, such as removing soles and heels and staining, brushing, and shining shoes. As they gain experience, trainees learn to replace heels and soles, to estimate the cost of repairs, and to deal with customers. Helpers usually become fully skilled in 6 months to 2 years; the length of training varies greatly with the individual and with the amount of time the skilled repairer can devote to training.

Only about 24 vocational training programs are available nationwide. Vocational training lasts from 6 months to 2 years, and is offered at high schools, trade schools, and community colleges. (Applicants to shoe repair programs at community colleges usually must have a high school diploma.) In vocational classes, students study shoe construction and practice different types of shoe repair. They also study the fundamentals of business practices. Graduates are encouraged to gain additional training by working with experienced shoe repairers.

Shoe repairers must have manual dexterity and mechanical aptitude to work with various machines and handtools. They must have self-discipline because they often work alone with little supervision. In addition to being skilled craft workers, repairers who own shops must have a pleasant manner in dealing with the public and a working knowledge of business practices, marketing, and accounting.

Many shoe repairers open their own shops. Some who are employed in large shops become supervisors.

Job Outlook

Employment of shoe repairers is expected to grow more slowly than the average for all occupations through the mid-1990's. For many years, employment declined because shoes were relatively inexpensive and many people bought new shoes instead of having old ones fixed. The popularity of cushion-soled footwear and other casual shoes which often are not practical to repair also limited the demand for these workers. The rising cost of shoes, however, has increased the demand for repairs, and employment is projected to grow somewhat.

Prospects for people with some knowledge of the trade are expected to be good because of the need to replace experienced shoe repairers who transfer to other occupations, retire, or leave the field for other reasons. Once trained, a shoe repairer is likely to find work with relatively little difficulty, although wages tend to be low and the work can be dirty. People with no experience or training may have difficulty finding jobs, however, because many shop owners are unwilling to hire inexperienced workers as helpers. Others are willing to take on trainees; terms vary from a small wage to a "tuition" charge.

Earnings

Shoe repairers earned about $200 a week in 1982, according to the limited information available. Many owners of shoe repair shops earned more than $450 a week after expenses.

Shoe repairers often work more than 40 hours a week. The workweek is sometimes 10 hours a day, 6 days a week.

Related Occupations

Other occupations in which workers make or repair items using leather and cloth are luggage repairers, rug repairers, saddlemakers, and custom shoemakers.

Sources of Additional Information

Information about the shoe repair business and training opportunities may be obtained from:

Shoe Service Institute of America, 154 W. Hubbard St., Chicago, Ill. 60610.

Information about employment and training opportunities is available from State employment service offices. Shoe shops and shoe service wholesalers in the community are another source of information about job openings.

Toolmakers and Diemakers

(D.O.T. 601.280 except -054; .281-010, -014, and -026; .380-010; .381-010, -014, -022, -026, -030, and -034; .382-042; and 739.381-018 and -022)

Nature of the Work

Toolmakers and diemakers are highly skilled workers who produce tools and special guiding and holding devices that are used to mass-produce a variety of machined metal parts. Toolmakers produce jigs and fixtures (devices that hold metal while it is bored, stamped, or drilled). They also make gauges and other measuring devices used in manufacturing precision metal parts. Diemakers construct metal forms (dies) to shape metal in stamping and forging operations. They also make metal molds for diecasting and for molding plastics. Toolmakers and diemakers also repair worn or damaged dies, gauges, jigs, and fixtures, and help design tools and dies.

Compared with most other machining workers, toolmakers and diemakers have a broader knowledge of machining operations, mathematics, and blueprint reading. Like machinists, toolmakers and diemakers use almost every type of machine tool and precision measuring instrument. Because they work with all the metals and alloys commonly used in manufacturing, these workers must be familiar with the machining properties, such as hardness and heat tolerance, of wide variety of metals and alloys.

Although the tasks required to make a tool or a die vary with each job, toolmakers and diemakers usually follow established procedures. Working from blueprints or instructions from supervisors, they plan the sequence of operations necessary to manufacture the tool or die. They measure and mark the pieces of metal that will be cut to form parts of the final product. They then do the cutting, boring, or drilling that is required. They check the accuracy of what they have done to insure that the final product will meet specifications. They then assemble the parts and perform finishing jobs such as filing and smoothing surfaces.

In all assignments, toolmakers and diemakers must work quickly and economically. Taking too much time or wasting materials can reduce their employer's profit.

Working Conditions

Toolmakers and diemakers usually work in "toolrooms," which are in an area of the plant separated from the production floor. Toolrooms usually are quieter than the production floor because there are not as many machines in use at one time. Although the work is not strenuous, toolmakers and diemakers are on their feet most of the day.

Working around high-speed machine tools presents certain dangers, so toolmakers and diemakers must follow strict safety procedures. For example, safety glasses with side shields and other protective clothing must be worn to protect against bits of flying metal.

Employment

Toolmakers and diemakers held 154,000 jobs in 1982, about 17,000 fewer than in 1980. This decline in employment reflects the drop in manufacturing activity during the 1981-82 recession.

Most toolmakers and diemakers work in industries that manufacture metalworking machinery, tools and dies, automobiles, aircraft, electrical machinery, and fabricated metal products. Although they are employed

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throughout the country, jobs are most plentiful in large metropolitan areas where many large factories are located.

Training, Other Qualifications, and Advancement

A formal apprenticeship program is the best way to learn tool-and-die making. In selecting apprentices, most employers prefer persons with a high school or vocational school education. Courses in shop math, physics, drafting, blueprint reading, and metalworking may help applicants land an apprentice position. Experience operating machine tools also can be helpful. Some employers test apprentice applicants to determine their mechanical aptitude and their mathematical ability.

Most of the 4 years of a tool-and-die apprenticeship are spent in practical shop training. Apprentices learn to operate the drill press, milling machine, lathe, grinder, and other machine tools. They also learn to use handtools in fitting and assembling tools, gauges, and other mechanical equipment, and study heat treating and other metalworking processes. Classroom training consists of shop mathematics, shop theory, mechanical drawing, tool designing, and blueprint reading. Several years of experience after apprenticeship are often necessary to qualify for the most difficult tool-and-die work. Some companies have separate apprenticeship programs for toolmaking and diemaking.

Some machining workers become toolmakers and diemakers without completing formal apprenticeships. After years of experience as skilled machine tool operators or machinists, plus additional classroom training, they develop into skilled all-round workers who can make tools and dies.

Skilled toolmakers and diemakers have numerous paths for advancement. Some advance to supervisory and administrative positions in their firms. Some become tool designers and others may open their own tool-and-die shops.

Job Outlook

Employment of toolmakers and diemakers is expected to increase about as fast as the average for all occupations through the mid-1990's. Some of this projected growth reflects a return of employment to prerecession levels. As the economy grows, the demand for automobiles, aircraft, machinery, and other products that use machined metal parts will increase. Rising demand for these goods will increase the need for tools and dies and the workers who make them. Employment may not grow as rapidly as production, however, due to changes in metalworking technology. The use of computer controlled machine tools and improvements in tool design will lessen the time needed to machine parts for tool and dies, thus increasing the output of toolmakers and diemakers.

In addition to jobs created by increased demand for toolmakers and diemakers, many openings will occur as workers transfer to other occupations or leave the labor force. The number of openings will be smaller than in other machining occupations because a smaller portion of toolmakers and diemakers than other machining workers leave their occupation each year. Toolmakers and diemakers have a strong attachment to their occupation because of their lengthy investment in training.

Tool-and-die makers may frequently work overtime in order to meet production deadlines.

Because of the long training period for toolmakers and diemakers there may be periodic shortages of these workers in areas with great deal of manufacturing activity. Firms often use overtime to meet deadlines when shortages occur.

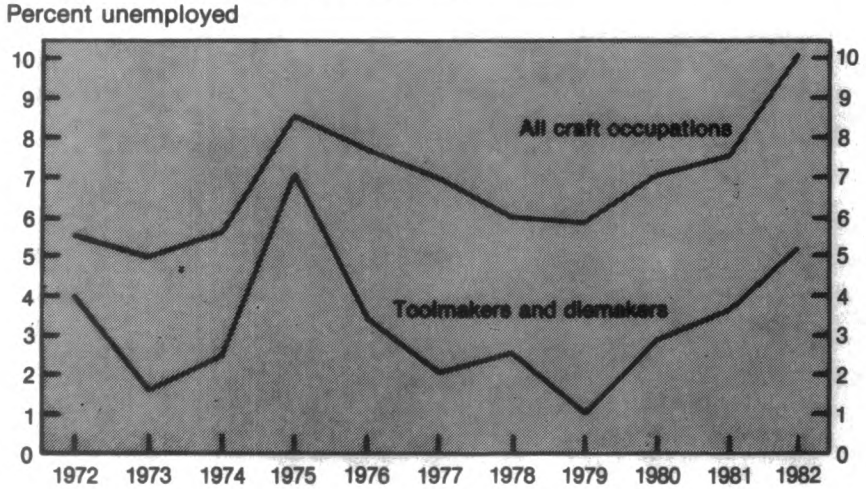
Employment of toolmakers and diemakers is less sensitive to fluctuations in the business cycle than many other production occupations. Employers usually are reluctant to lay off these highly skilled workers even when production is cut back because they fear the workers will not be available when economic conditions improve.

Earnings

Median weekly earnings for toolmakers and diemakers who worked full time were $435 in 1982. Most earned between $365 and $545 a week. Ten percent earned less than $250 a week, while the 10 percent with the highest weekly earnings made more than $645.

In 1982, toolmakers and diemakers employed in metropolitan areas had average earnings of $12.13 an hour. In comparison, the average for all nonsupervisory workers in private industry, except farming was $7.67. Table 1 presents average hourly rates in 13 areas selected to show how wage rates for tool-and-die makers differ in various parts of the country.

The unemployment rate for toolmakers and diemakers is lower than the rate for all craft occupations.



SOURCE: Bureau of Labor Statistics

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Table 1. Average hourly earnings of tool-and-die makers in selected areas, 1982

Area	Hourly rate
San Francisco-Oakland	$15.04
Davenport-Rock Island-Moline	14.03
Sacramento	13.94
San Jose	13.81
Dayton	13.21
Columbus, Ohio	13.06
Poughkeepsie	9.93
Northeast, Pa.	9.66
Providence-Warwick-Pawtucket	9.66
Portland, Me.	9.39
Greenville-Spartanburg	9.27
Worcester	9.26

SOURCE: Bureau of Labor Statistics.

Many toolmakers and diemakers are members of unions, including the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; and the United Steelworkers of America.

Related Occupations

The occupations most closely related to toolmaker and diemaker are, of course, the other machining occupations. These include machinists, instrument makers, machine tool operators, job-and-die setters, and tool programmers.

Other occupations that require precision and skill in working with metal include arc cutters, blacksmiths, gunsmiths locksmiths, metal patternmakers and welders.

Sources of Additional Information

For information about tool-and-die apprenticeships or other work opportunities in this trade, contact local tool-and-die shops, or the nearest office of the State employment service or State apprenticeship agency.

For general information about this occupation, contact:

The National Machine Tool Builders, 7901 Westpark Dr., McLean, Va. 22102.

The National Tooling and Machining Association, 9300 Livingston Rd., Ft. Washington, Md. 20744.

The International Association of Machinists and Aerospace Workers, 1300 Connecticut Ave. NW., Washington, D.C. 20036.

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Plant and Systems Operators

The workers described in this section of the *Handbook* operate, maintain, and repair machinery in industrial plants and systems. They monitor and control equipment that ranges in complexity from the simple boiler in the basement of an apartment building to the technologically advanced equipment in nuclear power and chemical plants and petroleum refineries.

Water and wastewater treatment plant operators run equipment that purifies and distributes water for human and industrial use, as well as disposes of liquid wastes, such as sewage, chemicals, and radioactive materials. Gas plant operators handle machinery that processes and distributes gas to business and residential customers. Power plant operators control machinery in hydroelectric fossil fuel and nuclear powerplants that provide electric energy for factories, office buildings, schools, and homes. Other plant and systems operators include chemical plant operators and petroleum plant operators.

Plants and systems vary in size, complexity, and degree of automation; some are run by only one operator at a time, others by many. Nevertheless, operators have certain tasks in common. They start up equipment and shut it down; monitor meters, gauges, or control panels; and make adjustments. They monitor or operate switches that control the flow of various materials and substances, take samples and run tests, record instrument instrument readings and switching operations, and do calculations. Operators also perform periodic inspections and maintenance.

As recent events have shown, accidents in places such as nuclear power plants can have very serious consequences indeed. Training requirements for operators have risen in recent years. In the past, many operators started out as laborers or helpers and were trained informally on the job. Now, however, as industrial equipment has become more complex and as safety in nuclear and other power plantsd is receiving greater attention, more formal training—available from vocational-technical institutes, community and 2-year colleges, apprenticeship programs, the Armed Forces, by employers, and government agencies. Certain plant and systems operators must hold a license or certificate. Detailed information on the training needed for some plant and systems operator occupations appears in the statements that follow.

Stationary Engineers

(D.O.T. 950.362, 382-018, -022, -026, and 030)

Nature of the Work

Stationary engineers operate, maintain, and repair the machinery that provides mechanical and electrical power for industry. They are also responsible for the equipment that heats, air-conditions, refrigerates, and ventilates factories and other buildings. The equipment they tend and control includes boilers, diesel engines, turbines, generators, pumps, condensers, and compressors. Much of it is similar to the nonstationary equipment operated by locomotive and marine engineers.

Stationary engineers start up and shut down equipment in order to meet demands for power and to insure the equipment is operating within established limits. They monitor meters, gauges, and other instruments attached to equipment and make adjustments whenever necessary. They also keep a log of all relevant facts about the operation and maintenance of the equipment. On a steam boiler, for example, they observe, control, and keep records of steam pressure, temperature, water level, power output, and the amount of fuel consumed. Stationary engineers control the flow of fuel to the boiler and the steam pressure by adjusting throttles, valves, or automatic controls.

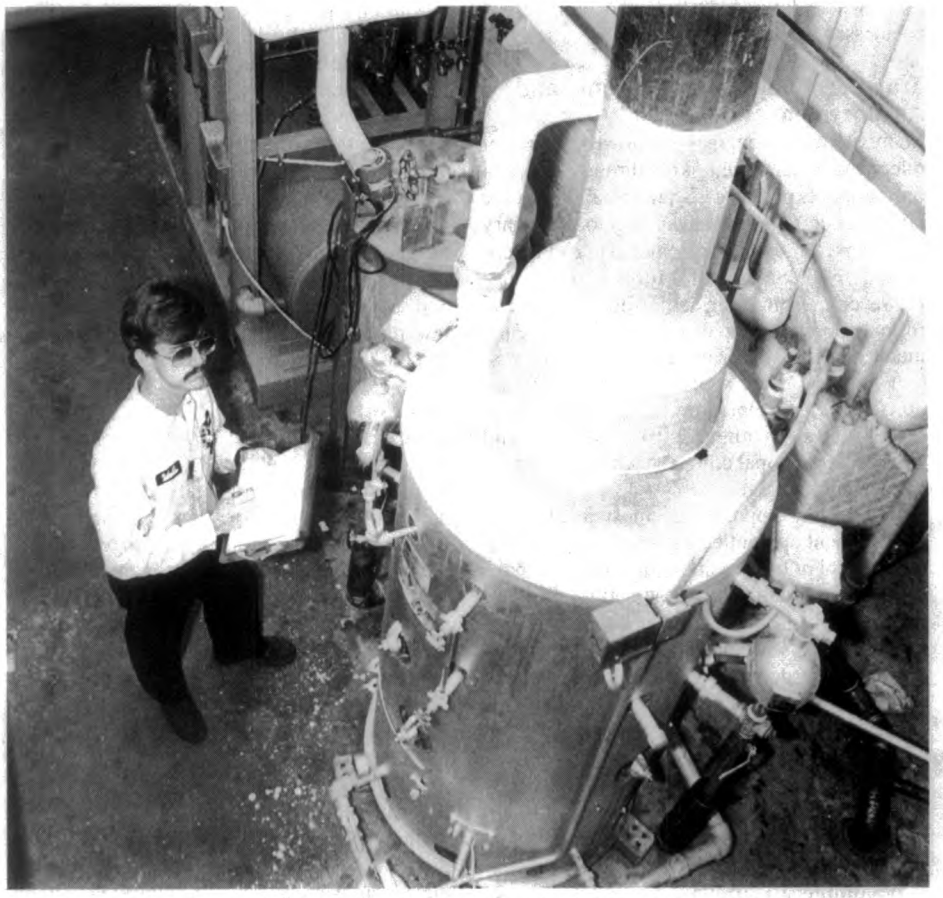
Stationary engineers must periodically remove from equipment the soot and corrosion that can reduce operating efficiency. They test boiler water and add necessary chemicals to prevent corrosion and build up of deposits in the boiler.

These workers detect, identify, and correct any trouble that develops. They watch and listen to their machinery and routinely check safety devices. Often stationary engineers use hand or power tools to make repairs, ranging from a complete overhaul to replacing defective valves, gaskets, or bearings.

In a large plant, the stationary engineer may be in charge of the powerplant or engine room and direct the work of assistant stationary engineers, turbine operators, boiler tenders, and air-conditioning and refrigeration operators and mechanics. In a small plant, the stationary engineer may be the only person operating and maintaining equipment.

Working Conditions

Stationary engineers generally have steady year-round employment. They usually work a 5-day, 40-hour week. In plants that operate



Stationary engineers must be alert to avoid burns, electric shock, and injury from machinery.

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around the clock, they may be assigned to any one of three shifts—often on a rotating basis—and to Sunday and holiday work.

Engine rooms, powerplants, or boiler rooms usually are clean and well lighted. Even under the most favorable conditions, however, some stationary engineers are exposed to high temperatures, dust, dirt, and high noise levels from the equipment. General maintenance duties may cause contact with oil and grease, and fumes or smoke. Workers are on their feet a lot; they also may have to crawl inside boilers and work in crouching or kneeling positions to inspect, clean, or repair equipment.

Because stationary engineers work around boilers and electrical and mechanical equipment, they must be alert to avoid burns, electric shock, and injury from moving machinery.

Employment

Stationary engineers held about 58,000 jobs in 1982. They work in a wide variety of places, including factories, hospitals, schools, office and apartment buildings, shopping malls, hotels, and power stations. Usually, plants that operate on three shifts employ four to eight stationary engineers, but some have more. In many plants, only one engineer works on each shift.

Because stationary engineers work in so many different kinds of industries, they are employed in all parts of the country. Although some are employed in small towns and in rural areas, most work in the more heavily populated areas where large industrial and commercial businesses are usually located.

Training, Other Qualifications, and Advancement

Many stationary engineers start as helpers or oilers and acquire their skills through informal on-the-job experience. They usually become boiler tenders before advancing to stationary engineers. A good background also can be obtained in the Navy or Merchant Marine. However, most training authorities recommend formal apprenticeship programs because of the increasing complexity of the machines and systems; programs are sponsored by the International Union of Operating Engineers and the International Brotherhood of Firemen and Oilers, the principal unions to which stationary engineers belong.

In selecting apprentices, most local labor-management apprenticeship committees prefer high school or trade school graduates who have received instruction in mathematics, mechanical drawing, machine-shop practice, physics, and chemistry. Mechanical aptitude, manual dexterity, and good physical condition also are important qualifications.

The apprenticeship usually lasts 4 years. In addition to on-the-job training, apprentices receive classroom instruction in practical chemistry, elementary physics, blueprint reading, applied electricity, instrumentation, electronics, and other technical subjects.

Becoming a stationary engineer without going through a formal apprenticeship program usually takes many years of experience as an assistant to a licensed stationary engineer or as a boiler tender. This practical experience can be supplemented by technical or other school training or home study.

Many States and cities have licensing requirements for stationary engineers. Although requirements differ from place to place, applicants usually must be at least 18 years of age, reside for a specified period in the State or locality in which the examination is given, meet the experience requirements for the class of license requested, and pass a written examination.

Generally, there are several classes of stationary engineer licenses. Each class specifies the steam pressure or horsepower of the equipment the engineer can operate without supervision. The first class license permits the stationary engineer to operate equipment of all types and capacities. An applicant for this license may be required to have a high school education and an approved apprenticeship or on-the-job training. The lower class licenses limit the capacity of the equipment the engineer may operate without the supervision of a higher rated engineer.

Because of regional differences in licensing requirements, a stationary engineer who moves from one State or city to another may have to pass an examination for a new license. However, the National Institute for Uniform Licensing of Power Engineers has helped 21 States adopt a standardized licensing program that eliminates this problem by establishing reciprocity of licenses.

Stationary engineers advance to more responsible jobs by being placed in charge of larger, more powerful, or more varied equipment. Generally, engineers advance to these jobs as they obtain higher class licenses. Advancement, however, is not automatic. For example, an engineer who has a first-class license may work for some time as a boiler tender or an assistant to another first-class engineer before a vacancy occurs. Some stationary engineers eventually advance to jobs as plant engineers and as building and plant superintendents. A few obtain jobs as examining engineers and technical instructors.

Job Outlook

Little change in employment of stationary engineers is expected through the mid-1990's despite expanding industrial needs for more mechanical and electrical power. Employment in the occupation remained fairly constant through the 1970's due to automation and the shift to more powerful and centralized equipment. These trends will continue to limit growth in the future. Nevertheless, many job openings will arise because of the need to replace experienced workers who transfer to other occupations, retire or leave the labor force for other reasons, or die.

Earnings

Stationary engineers had average hourly earnings of $10.38 in 1981, according to a survey of metropolitan areas. This was almost 40 percent higher than the average for all nonsupervisory workers in private industry, except farming. Average earnings for engineers in individual cities ranged from $6.65 in the Jackson, Mississippi, metropolitan area to $12.33 in the Detroit metropolitan area.

The principal unions to which these workers belong are the International Union of Operating Engineers and the International Brotherhood of Firemen and Oilers.

Related Occupations

Other workers who monitor and operate stationary machinery include nuclear reactor operators, power station operators, wastewater treatment plant operators, waterworks pumpstation operators, chemical operators, and refinery operators.

Sources of Additional Information

Information about training or work opportunities is available from local offices of State employment services, locals of the International Union of Operating Engineers, and from State and local licensing agencies.

Specific questions about the occupation may be referred to:

International Union of Operating Engineers, 1125 17th St. NW., Washington, D.C. 20036.

National Association of Power Engineers, Inc., 176 West Adams St., Chicago, Ill. 60603.

For questions concerning licensing requirements, contact:

National Institute for Uniform Licensing of Power Engineers, 1436 Fritz Rd., Verona, Wis. 53593.

Water and Wastewater Treatment Plant Operators

(D.O.T. 551.485-010; 954.382-010, -014; and 955.362-010, .382-010 and .585-010)

Nature of the Work

Clean water is essential for many things: Health and recreation; the existence of fish and wildlife; and the functioning of industries. Water treatment plant operators treat water so that it is pure and safe to drink. Wastewater treatment plant operators, sometimes referred to as sewage plant operators, remove harmful domestic and industrial pollution from waste water.

Water is pumped from rivers and streams to water treatment plants. Waste materials are carried by water through sewer pipes to wastewater treatment plants. Operators in both types of plants control processes and equipment to remove solid materials, chemicals, and organisms from the water or render them harmless. By operating and maintaining the pumps, pipes, valves, and processing equipment of the treatment facility, operators move the water or wastewater through the various treatment processes.

Operators read and interpret meters and gauges to make sure plant equipment and processes are working properly and adjust controls

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as needed. They operate chemical-feeding devices; take samples of the water or wastewater and perform chemical and biological laboratory analyses; and test and adjust the level of chlorine in the wastewater. Operators also make minor repairs to valves, pumps, and other equipment. They use gauges, wrenches, pliers, and other common handtools, as well as special tools. Occasionally operators must work under emergency conditions. A heavy rainstorm, for example, may cause an abnormal amount of wastewater to flow into sewerpipes which exceeds a plant's treatment capacity. Emergencies also can be caused by conditions inside a plant, such as chlorine gas leaks or oxygen deficiencies.

The duties of operators vary depending on the type and size of plant. In smaller plants, one operator may control all machinery, perform tests, keep records, handle complaints, and do repairs and maintenance. The operators even may handle both a water treatment and a wastewater treatment plant. In larger plants, with many employees, operators may be assigned to one process or one station, and the staff may include chemists, engineers, laboratory technicians, mechanics, helpers, supervisors, and a superintendent.

Water pollution standards have become increasingly stringent since adoption of the Federal Water Pollution Control Act of 1972. To implement the law, a national system of uniform controls on the discharge of pollutants was set in motion. Under the 1972 law, as amended by the Clean Water Act of 1977, it is illegal to discharge any pollutant without a permit. Industrial facilities that send their wastes to municipal treatment plants must meet certain minimum standards and insure that these wastes have been adequately pretreated so that they do not damage municipal treatment facilities. Municipal treatment plants must also meet discharge standards. In order to meet these requirements, operators will have to be able to operate more sophisticated systems.

Working Conditions

Wastewater treatment plant operators work both indoors and outdoors and may be exposed to noise from machinery and unpleasant odors, although chlorine and other chemicals are used to minimize these. Persons with allergies might suffer due to dust and other substances in the air. Because plants operate around the clock, operators are required to work shifts and on weekends and holidays. During emergencies, overtime is common. Operators have to stoop, reach, and climb and often get their clothes dirty. Sometimes they are confronted with hazardous conditions, such as slippery walkways, dangerous gases, and malfunctioning equipment.

Employment

Water and wastewater treatment plant operators held about 72,000 jobs in 1982. The vast majority worked for local governments; some worked for private water supply companies and chemical manufacturing companies. About 2,000 were employed by the Federal Government, mostly by the Armed Forces.

Water and wastewater treatment plant operators are employed throughout the country. Geographically, employment is distributed much like the Nation's population, with most jobs in larger towns and cities. Many operators in small towns are employed part time or handle additional duties.

Training, Other Qualifications, and Advancement

Trainees usually start as attendants or operators-in-training and learn their skills on the job under the direction of an experienced operator. They learn by observing the processes and equipment in operation and do routine tasks such as recording meter readings; taking samples of wastewater and sludge; and doing simple maintenance and repair work on pumps, electric motors, and valves. They also clean and maintain plant equipment and property. Larger treatment plants generally have more formal "in-house" training programs.

Operators need mechanical aptitude and should be competent in basic mathematics. Employers generally prefer trainees who have a high school diploma or its equivalent. In some States this is a minimum educational requirement. Some positions, particularly in larger cities and towns, are covered by civil service regulations, and applicants may be required to pass written examinations testing elementary mathematics skills, mechanical aptitude, and general intelligence. Operators must be agile, since they have to climb ladders and move easily around heavy machinery.

Some 2-year programs leading to an associate degree in wastewater technology and 1-year programs leading to a certificate are available; these provide a good general knowledge of water pollution control as well as basic preparation for becoming an operator. Because plants are becoming more complex, completion of such courses increases an applicant's chances for employment and promotion.

Most State water pollution control agencies offer training courses to improve operators' skills and knowledge. These courses cover principles of treatment processes and process control, laboratory procedures, odors and their control, safety, chlorination, sedimentation, biological oxidation, sludge treatment and disposal, and flow measurements. Some operators take correspondence courses on subjects related to wastewater treatment, and some employers pay part of the tuition for related college courses in science or engineering.

Operators may be promoted to plant supervisor or superintendent. A high school diploma

Water and sewage treatment plant operators clean water by removing harmful domestic and industrial waste.

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and increasingly responsible experience as an operator may be sufficient to qualify for superintendent of a small plant, since at many small plants the superintendent also serves as an operator. However, educational requirements are rising as larger, more complex treatment plants are built to meet new water pollution control standards. Superintendents of large plants generally need an engineering or science degree. A few operators get jobs with State water pollution control agencies as technicians, who monitor and provide technical assistance to plants throughout the State. Vocational-technical school or community college training generally is preferred for technician jobs. Experienced operators may transfer to related jobs with industrial wastewater treatment plants, companies selling wastewater treatment equipment and chemicals, engineering consulting firms, or vocational-technical schools.

In 44 States, supervisors and certain operators must pass an examination to certify that they are capable of overseeing treatment plant operations. Voluntary certification programs are in effect in the remaining States. Typically, there are different classes of certification for different sizes of treatment plants.

Job Outlook

Employment of wastewater treatment plant operators is expected to grow more slowly than the average for all occupations through 1995, due to a slowdown in the rate of construction of new treatment plants. In addition, modernization and automation of existing plants may decrease the need for some types of operators. Nevertheless, many job openings will occur as experienced operators transfer to other occupations, retire, or die. Persons with formal training will have the competitive edge in being hired or advancing to supervisory positions.

People who enter this field generally enjoy steady employment because treatment of water is essential even during economic downtowns.

Earnings

According to a survey conducted by the Water Pollution Control Federation, annual salaries of wastewater treatment plant operators averaged $14,600 in 1982; for supervisors they averaged $17,500. Salaries depend, among other things, on the size of the plant, the complexity of the operator's job, and the operator's level of certification.

Related Occupations

Other workers whose main activity consists of operating a system of machinery to process or produce materials include boiler operators, gas-compressor operators, powerplant operators, power reactor operators, stationary engineers, turbine operators, and waterworks pump-station operators.

Sources of Additional Information

Environmental Protection Careers Guidebook, a 1980 publication of the U.S. Department of Labor and the U.S. Environmental Protection Agency, describes a number of water and wastewater treatment occupations and contains a list of postsecondary environmental education programs (including wastewater programs).

For further information on training, contact:

National Environmental Training Association, 158 S. Napoleon St., P.O. Box 2266, Valparaiso, Ind. 46383.

For information on certification, contact:

Association of Boards of Certification, Municipal Building, Ames, Iowa 50010.

Additional information is available from:

Water Pollution Control Federation, 2626 Pennsylvania Ave. NW., Washington, D.C. 20037.

For information on jobs, contact State or local water pollution control agencies or local offices of the State employment service.

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Machine Operators, Tenders, and Setup Workers

Workers in this occupational group set up, adjust, operate, and tend numerous kinds of machinery and equipment. These workers generally have job titles related to the type of machine they handle such as rolling machine setup operator, printing press operator, sewing machine operator, and motion picture projectionist.

Skilled machine setup operators adjust the speed, feed, and other controls on machines according to the specifications of a particular product or job. They then test the machines to make certain they are functioning properly and producing parts that conform to job specifications. After this determination has been made, semiskilled machine operators begin production. It is their job to control and monitor machines and equipment and make necessary adjustments during production.

In small establishments, workers may perform a wider range of tasks than in large establishments, where workers' duties may be more specialized. Some skilled workers may set up, operate, and tend equipment throughout the production process.

Most machine operators, tenders, and setup workers are employed in factories in the mass production of goods. Working conditions in factories have improved substantially in recent years. The use of modern equipment and safety procedures has reduced the rate of accidents. Most factories are clean and well lighted and some modern factories are air-conditioned. However, many workers must perform their jobs under rather unpleasant conditions. For example, electroplaters and boiler tenders may be exposed to fumes. Forge shops can be very hot and noisy. And working around even the most modern high-speed machines can still be dangerous.

Some machine operators such as motion picture projectionists work in nonmanufacturing industries where the injury rate is much lower than in manufacturing industries. Because of the repetitive nature of some tasks, machine operators, tenders, and setup workers may find their jobs tedious and boring.

Persons interested in these jobs should have manual dexterity and be mechanically inclined to use the tools and machinery required in their work. Physical stamina is important because many machine operators, tenders, and setup workers, such as production painters, must stand for long periods of time and do a considerable amount of reaching and bending. Physical strength is essential for jobs such as printing press operator and electroplater which require some heavy lifting and carrying. Precision, accuracy, and the ability to visualize three-dimensional objects from drawings also are important characteristics for many of these workers.

Many jobs as machine operators, tenders, and setup workers do not require a high school diploma. However, employers often prefer high school or vocational school graduates who have taken courses in mathematics, machine shop, and blueprint reading.

Most workers learn these jobs through on-the-job training provided by their employers. Skilled workers, such as machine tool setup workers, often complete formal apprenticeship programs. Some experienced workers may be required to take courses to keep abreast of new technologies.

This section of the *Handbook* includes statements on selected machine operators, tenders, and setup workers. In addition to more detailed information on the nature of the work, employment, working conditions, and training requirements, these statements discuss job outlook and earnings.

Machine Tool Operators

(List of D.O.T. codes available upon request. See footnote 4 on p. 373.)

Nature of the Work

Machine tool operators use machine tools to shape metal to precise dimensions. They usually are identified by the kind of machine they operate, such as lathe operator, milling machine operator, drill press operator, and punch press operator. Although some operators can work with a variety of machine tools, most specialize in one or two types.

Most operators only tend machines, performing simple, repetitive operations that can be learned relatively quickly. Typically, these operators place rough metal stock in a machine tool on which the speeds and operation sequence already have been set by job-and-die setters. (See the statement on job-and-die setters elsewhere in the *Handbook*.) Operators may watch one or more machines and make minor adjustments according to their instructions. However, they depend on skilled machining workers for major adjustments when their machines are not working properly.

Some operators perform more varied and complex machining operations. The work of these more skilled machine tool operators is similar to that of machinists, except that these operators usually are able to run only one type of machine and do little or no hand fitting or assembly work. Skilled machine tool operators plan and set up the correct sequence of machining operations according to blueprints, layouts, or other instructions. They adjust speed, feed, and other controls, and select the proper cutting instruments or tools for each operation. Using micrometers, gauges, and other precision measuring instruments, they compare the completed work with the tolerance limits given in the specifications. They also may select cutting fluids to keep the metal workpiece from getting too hot, and lubricants to keep the machine tools running smoothly.

Working Conditions

Most machine shops are clean, well-lighted, and well-ventilated. However, powerful, high-speed machine tools can be dangerous if strict safety rules are not observed. Machine tool operators must wear safety glasses and other devices to protect themselves from flying metal particles. They cannot wear loose-fitting clothes or jewelry that might get caught in the machine, injuring the operator. When working around noisy machinery, operators must wear earmuffs or earplugs.

Employment

Machine tool operators held about 914,000 jobs in 1982, 109,000 fewer than in 1980. This decline reflects the severe dropoff in manufacturing activity during the 1981-82 recession. The distribution of employment among specific operator occupations is presented in the following tabulation.

	Percent
Total	100.0
Combination machine tool operators	18.4
Metal punch press operators	16.0
Metal lathe machine operators	14.9
Grinding/abrading machine operators	12.9
Drill press/boring machine operators	12.6
Numerical control machine tool operators	7.2
Milling/planing machine operators	6.6
Power brake, bending machine operators	4.5
Toolroom machine tool operators	3.8
Metal shear and/or slitter operators	2.9

Most machine tool operators work in factories that produce fabricated metal products, transportation equipment, and machinery in large quantities. They are concentrated in large metropolitan areas where manufacturing activity is centered.

Training, Other Qualifications, and Advancement

Most machine tool operators learn their skills on the job. Beginners usually start by observing experienced operators at work. Later, they learn to use measuring instruments and to make elementary computations needed in shopwork. When trainees first operate a machine, they are

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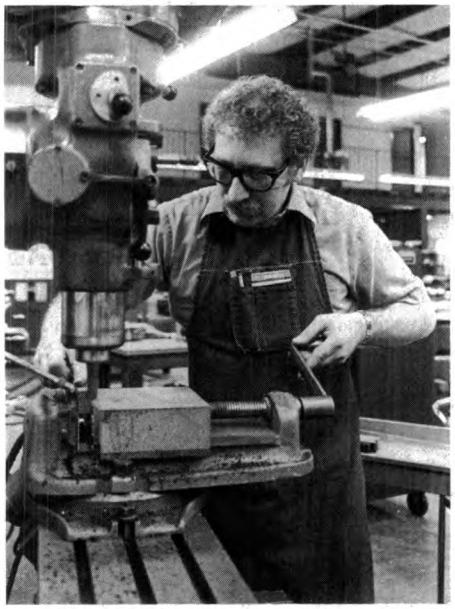


The more highly skilled machine tool operators plan and set up the correct sequence of machining operators.

supervised closely by more experienced workers. After gaining some experience, beginners often take over more of the duties associated with the machines they operate. For example, they may learn to adjust feed speeds and cutting edges, instead of calling upon other workers to perform these tasks. Some also may learn to read blueprints and plan the sequence of machining work.

Individual ability and effort largely determine the time required to become a machine tool operator. Most operators learn the basic machine operations and functions in a few months, but becoming a skilled operator often requires 1 to 2 years. Some companies have formal training programs for new employees.

Although no special education is required for jobs, persons seeking such work can improve their opportunities by completing courses in mathematics and blueprint reading. In hiring beginners, employers often look for persons with mechanical aptitude and some experience in working with machinery. Physical stamina is important since much time is spent standing. Applicants should be able to work independently. They also should not mind working in a relatively small workspace.

Machine tool operators may become job-and-die setters or transfer to trainee jobs for skilled machining occupations such as machinists and toolmakers and diemakers.

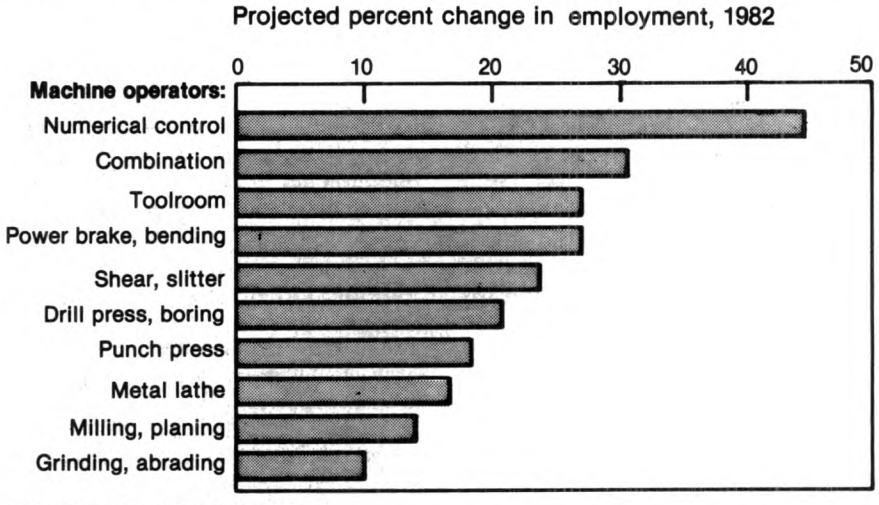
Job Outlook

Overall employment of machine tool operators is expected to increase about as fast as the average for all occupations through the mid-1990's. Much of this projected growth reflects a return of employment to prerecession levels. In addition to openings arising from growth in demand for these workers, many thousands of openings are expected to occur each year in this large occupation as operators transfer to other fields of work, retire, or die.

More machine tool operators will be needed as metalworking industries expand their output. However, the use of faster and more versatile automatic machine tools and numerically controlled machine tools will result in greater output per worker and will tend to limit growth in employment especially in less skilled jobs. Other factors that may slow growth in this occupation are improved processes in metalworking, such as electrical discharge and ultrasonic machining, and the use of powdered metals that reduce the need for final machining on some products. Workers with thorough backgrounds in machining operations, mathematics, blueprint reading, and a good working knowledge of the properties of metals will be better able to adjust to the changing job requirements that will result from technological advances.

The number of openings may fluctuate greatly from year to year due to changes in economic conditions. When demand slackens for automobiles, aircraft, and other products that use machined metal parts, production runs may be stopped or restricted, and workers be laid off or may face a shortened workweek.

Among machine tool operators, numerical control machine operators are expected to experience the most rapid growth.



SOURCE: Bureau of Labor Statistics

Earnings

Median weekly earnings of machine tool operators were $330 in 1982. Most earned between $245 and $420 a week. Ten percent of all operators had median weekly earnings of less than $190, while the 10 percent with the highest earnings made more than $490 a week.

Machine tool operators are paid according to hourly or incentive rates, or by a combination of both methods. In 1982, hourly earnings of machine tool operators in metropolitan areas ranged from $8.50 to $12.10, depending on the type of machine operated. In comparison, the average hourly rate for all production workers in private industry, except farming was $7.67.

Most machine tool operators belong to unions, including the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the International Union of Electrical, Radio and Machine Workers; the International Brotherhood of Electrical Workers; and the United Steelworkers of America.

Related Occupations

The occupations most closely related to machine tool operators are, of course, the other machining occupations. These include machinists, job-and-die setters, toolmakers and diemakers, and instrument makers.

Other occupations that require precision and skill in working with metal include arc cutters, blacksmiths, gunsmiths, locksmiths, metal patternmakers and welders.

Sources of Additional Information

For information about work opportunities in this occupation contact the nearest office of the State employment service.

For general information about this occupation, contact:

The National Machine Tool Builders, 7901 Westpark Dr., McLean, Va. 22102.

The National Tooling and Machining Association, 9300 Livingston Rd., Ft. Washington, Md. 20744.

The National Screw Machine Products Association, 6700 W. Snowville Rd., Breckville, Ohio 44141.

The International Association of Machinists and Aerospace Workers, 1300 Connecticut Ave. NW., Washington, D.C. 20036.

Printing Press Operators

(D.O.T. 651, 652, 715, 971, and 979. D.O.T. index which begins on p. 364 lists the nine-digit codes included under this occupation.)

Nature of the Work

Printing press operators prepare and operate the printing presses in a pressroom. Before actually

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starting the press, press operators set it up and adjust it to insure that the printing impressions are distinct and uniform. Press operators first insert and lock type setups or plates into the press bed and tighten the locking attachment with a wrench. The operators then level the pressplates by placing pieces of paper that are exactly the right thickness underneath low areas of the plates. Press operators also adjust control margins and the flow of ink to the inking roller. In some shops, they oil and clean the presses and make minor repairs. Press operators who work with large presses have assistants and helpers.

Press operators' jobs may differ from one shop to another, mainly because of differences in the kinds and sizes of presses in the shop. Press operators in small commercial shops generally operate relatively simple manual presses. On the other hand, a crew of several press operators and press assistants runs giant presses used by the large newspaper, magazine, and book printers. These presses are fed paper in big rolls called "webs" up to 50 inches or more in width. They print the paper on both sides; cut, assemble, and fold the pages; and count the finished sections as they come off the press.

Many modern plants have installed printing presses that use computers and sophisticated instrumentation to control press operations. With this equipment, the press operator monitors a control panel that detects problems. To adjust the press, the operator pushes the proper button on the control panel. Press operators are generally designated according to the type of press they operate: Letterpress, gravure, or offset.

Working Conditions

Operating a press is physically demanding. Press operators are on their feet most of the time and have to lift heavy plates. Pressrooms are noisy, and workers in certain areas frequently wear ear protectors. Press operators are subject to hazards when working near machinery. Often, they work under pressure to meet deadlines. Many press operators work evening and night shifts.

Employment

Press operators held about 174,000 jobs in 1982. About half were in commercial printing shops and book and magazine publishing firms. Many others were in newspaper plants. Some press operators worked for banks, insurance companies, paper manufacturers, and organizations that do their own printing, such as Federal, State, and local governments.

Printing and publishing is one of the most geographically dispersed industries in the United States, and press operators can find jobs throughout the country. However, jobs are concentrated in large printing centers such as New York, Chicago, and Los Angeles.

Training, Other Qualifications, and Advancement

Most press operators learn their trade through apprenticeship or on the job. The length and content of training depend largely on the kind of press used in the plant. Most press operators are trained to operate more than one press, but specialize in a particular area of printing such as lithography, letterpress, or gravure. The apprenticeship period in commercial shops is 4 years for press operators. In addition to on-the-job instruction, the apprenticeship includes related classroom or correspondence school courses. Courses in printing provide a good background. Because of technical developments in the printing industry, courses in chemistry, electronics, and physics are helpful.

Mechanical aptitude is important in making press adjustments and repairs. An ability to visualize color is essential for work on color presses.

Technological changes have had a tremendous effect on the skills needed by press operators. For example, printing plants which change from sheet-fed offset presses to web-offset presses have to retrain their entire press crew because the skill requirements for the two types of presses are very different. Web-offset presses, with their faster operating speeds, require faster decisions, monitoring of more variables, and greater physical effort.

Press operators may advance in pay and responsibility by taking a job working on a more complex printing press. For example, a two-color sheet-fed press operator may become a four-color sheet-fed press operator. Others may advance to press operator-in-charge and be responsible for the work of the entire press crew.

Job Outlook

Employment of press operators is expected to grow more slowly than the average for all occupations through the mid-1990's. Productivity improvements centering around faster and more efficient web-offset presses will permit the rapidly growing demand for printed materials to be met with only a modest rise in the number of press operators. The dominant trend in major industry sectors such as newspapers is for employment of production workers to grow much more slowly than that of administrative, managerial, sales, and other nonproduction workers. Technological breakthroughs—the application of microprocessors to printing and binding equipment, for example—could further reduce labor requirements in the years ahead. Most opportunities for printing press

Adjusting the press is part of the printing press operator's job.

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operators will reflect the need to replace experienced workers who leave the occupation.

Printing press operators are expected to face competition for jobs. The number of applicants to training programs is likely to exceed the number of openings.

Earnings

The basic wage rate for a press operator depends on the type of press being run and the area of the country in which the work is located. In early 1983, according to limited data from union contracts, the basic wage rate for letterpress operators in unionized firms ranged from $10.40 to $15.49 an hour. Lithographic press operators earned from $11.30 to $15.94 an hour on a single-color 19x25-inch press. Operators working on larger, multicolor presses earned more.

Related Occupations

Other workers who set up and operate production machinery are papermaking machine operators, shoemaking machine operators, bindery machine operators, and precision machine operators.

Sources of Additional Information

Details about apprenticeships and other training opportunities may be obtained from local employers such as newspapers and printing shops, the local office of the unions mentioned below, or the local office of the State employment service.

For general information about press operators, write to:

Graphic Communications International Union, 1900 L St. NW., Washington, D.C. 20036.

Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

Printing Industries of America, Inc., 1730 N. Lynn St., Arlington, Va. 22209.

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Fabricators, Assemblers, and Handworking Occupations

The workers discussed in this section of the *Handbook* produce manufactured goods. Using handtools and hand-held power tools, they perform tasks ranging from the repetitive to the highly intricate.

Most entry level jobs require relatively little formal education; few employers insist on a high school diploma. What counts is the ability to perform. Workers acquire their skills on the job, usually in a matter of days or weeks. Formal training programs are available for the more technically demanding occupations such as welding, however.

It is in this type of work—highly repetitive and requiring minimum skills—that commercial robots are most productive, and an increasing number of jobs will be lost to these mechanical workers in the years ahead. The use of robots for assembling, painting, and welding will reduce employment in the automobile industry, for example.

Many of the fabricating, assembly, and handworking occupations are sensitive to fluctuations in the business cycle. As factory orders decline during economic downturns, workers may experience shortened workweeks, layoffs, and plant closings. Workers employed in motor vehicle and other durable goods manufacturing or in industries that produce construction and building materials are especially affected by changes in business conditions. On the other hand, workers in industries such as electronic equipment and computer manufacturing are less likely to be affected. More information about job opportunities and job security appears in the statements that follow.

Assembler Occupations

(List of D.O.T. codes available on request. See footnote 4 on p. 373.)

Nature of the Work

When Henry Ford began producing automobiles on an assembly line, modern mass production was born. Workers who had been building each automobile independently now found themselves specializing in just one part of the job. Production became a team effort, with each worker performing a single task on every car rolling by on the line. Over the years, mass production spread to other industries; today, almost every manufactured item is produced in this way.

Workers who put together the parts of manufactured articles are called assemblers. Sometimes hundreds of assemblers work on a single finished product.

Assemblers usually work on items that move past their work stations automatically on conveyors. In the automobile industry, for example, one assembler may put nuts on bolts by hand or with a handtool, and the next worker down the line may tighten the nuts with a power wrench. These workers must complete their job within the time it takes the item to pass their work station.

Other assemblers, known as bench assemblers, do more delicate work. Some bench assemblers make subassemblies. Subassemblies are the intermediate steps in the production process; for example, steering columns for automobiles or motors for vacuum cleaners. Other bench assemblers make entire products. Bench assemblers in rifle manufacturing plants, for example, build complete rifles from a collection of parts and subassemblies. They then test the finished product to be sure it functions correctly. Benchwork generally requires the ability to do precise and detailed work. Electronics bench assemblers use tweezers, tiny cutters, and magnifying lenses to put together the small components used in radios and calculators.

Another group of assemblers, called floor assemblers, put together large machinery or heavy equipment on shop floors. School buses, cranes, and tractors are put together in this way. Parts are often brought to the floor station by huge overhead cranes or conveyors, and are installed and fastened together, usually with bolts, screws, or rivets. Assemblers often use a power tool, such as a grinder or power drill, to get a proper fit.

Some experienced assemblers work with little or no supervision on the more complex parts of subassemblies and are responsible for the final assembly of complicated jobs. They may assemble a television set or put together and test a calculator. Some work with the engineers and technicians, assembling products that these people have just designed. To test new ideas and build models, these workers must know how to read blueprints and engineering specifications and how to use a variety of tools and precision measuring instruments.

Working Conditions

The working conditions of assemblers differ, depending on the particular job performed. Bench assemblers work while seated at tables. Many of them work in rooms that are clean, well lighted, and free from dust. Floor assemblers of industrial machinery may come in contact with oil and grease, and their working areas may be quite noisy due to machinery or tools being used nearby. They may have to lift and fit heavy objects. Workers on assembly lines are under pressure to keep up with the speed of the lines. Since most assemblers only perform a few steps in the assembly process, assembly jobs tend to be monotonous.

Work schedules of assemblers may vary at plants with more than one shift. Workers can accept or reject a certain job on a given shift, usually in order of seniority.

Employment

Virtually all of the 1,313,000 assembler jobs in 1982 were in plants that manufacture durable goods. One out of three jobs involved assembly of electronic and electrical machinery, equipment, and supplies including electrical switches, welding equipment, electric motors, lighting equipment, household appliances, and radios and television sets. Nearly one job in five involved assembly of nonelectrical machinery (diesel engines, steam turbine generators, farm tractors, mining and construction machinery, computers, and window air-conditioners).

The following tabulation lists the industries that provided most wage and salary jobs for assemblers in 1982:

	Percent
Total	100.0
Electrical and electronic machinery and equipment	33.9
Machinery, except electrical	18.9
Transportation equipment	13.3
Professional and scientific instruments	9.1
Fabricated metal products	8.2
Lumber and wood products	3.6
Furniture and fixtures	3.6
Miscellaneous manufacturing industries	3.3
Other	6.1

Assemblers are concentrated in the heavily industrialized States of California, New York, Michigan, Illinois, Ohio, and Pennsylvania.

Training, Other Qualifications, and Advancement

Employers seek workers who can do routine work at a fast pace. A high school diploma is helpful but usually is not required.

For some types of assembly jobs, applicants may have to meet special requirements. Some employers look for applicants with mechanical aptitude and prefer those who have taken vocational school courses such as machine shop. Good eyesight, with or without glasses, may be required for assemblers who work with small

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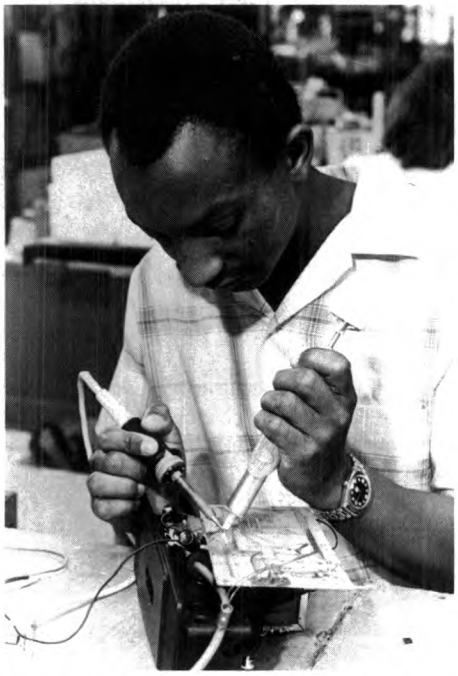

Most assemblers work in plants that manufacture durable goods.

parts. In plants that make electrical and electronic products, which may contain many different colored wires, applicants often are tested for color blindness.

Inexperienced people can be trained to do most kinds of assembly work in a few days or weeks. New workers may have their job duties explained to them by the supervisor and then be placed under the direction of experienced employees. When new workers have developed sufficient speed and skill, they are placed on their own and are responsible for the work they do.

As assemblers become more experienced, they may progress to assembly jobs that require more skill and be given more responsibility. Experienced assemblers who have learned many assembly operations and thus understand the construction of a product may become product repairers. These workers fix assembled articles that inspectors have identified as defective. Assemblers also may advance to inspector, or be promoted to supervisor. In some firms, assemblers can become trainees for one of the skilled trades.

Job Outlook

Although employment of assemblers is expected to grow about as fast as the average for all occupations through the mid-1990's, some of that growth will represent a recovery from the heavy layoffs that accompanied the 1981-82 recession. Opportunities are not expected to be equally favorable throughout the economy, nor are they expected to be uniform throughout the period, for the job outlook for assemblers varies with the fortunes of the industries that employ them.

Although the popular perception is that robot technology is replacing assemblers in droves, most assembly work is beyond the capabilities of today's robots. The extent to which robots will displace assemblers—but create jobs for technicians and repairers to build, program, and maintain the new robots—is a topic of controversy. Certainly, not all assemblers can be replaced efficiently by automated manufacturing processes. Robots are expensive and a large volume of work is required to justify their purchase. They may not be economical in small operations with perhaps only one shift per day. Also, where the assembly parts involved are small or irregular in size, robot technology is only now making inroads. The effect of automation on assembler employment through the mid-1990's is expected to differ among industries depending on how rapidly and extensively the technology can be adopted. Assemblers' employment opportunities probably will vary geographically. Areas of industrial growth such as the Sunbelt States are expected to provide the best prospects.

Since assembler jobs generally require limited formal education or training, there is substantial movement into and out of the occupation. A very large proportion of assemblers leave the occupation each year. In fact, most job openings arise from the need to replace assemblers who retire or leave the occupation for other reasons.

Earnings

The median earnings for assemblers working full time were about $246 a week in 1982. The middle 50 percent earned between $190 and $400 a week. The lowest 10 percent earned less than $160 a week and the highest 10 percent, more than $440.

Wage rates for assemblers working under union contracts ranged from about $5.50 to $9 an hour in 1983, according to limited information. Most assemblers covered by these contracts made between $7 and $8 an hour. Some assemblers are paid incentive or piecework rates, and, therefore, can earn more by working faster.

Many assemblers are members of labor unions. These unions include the International Association of Machinists and Aerospace Workers; the International Union of Electrical, Radio and Machine Workers; the United Automobile, Aerospace and Agricultural Implement Workers of America; the International Brotherhood of Electrical Workers; and the United Steelworkers.

Related Occupations

Other occupations which involve handling and assembling things are welders, packers and wrappers, ophthalmic laboratory technicians, and operators of drill presses, laminating machines, grinders, and riveting machines.

Source of Additional Information

Information about employment opportunities for assemblers is available from local offices of the State employment service.

Automotive Painters

(D.O.T. 845.381-010 and -014)

Nature of the Work

Automotive painters make old and damaged motor vehicles "look like new." These skilled workers repaint older automobiles, trucks, and buses that have lost the luster of their original paint and make fender and body repairs almost invisible.

When painting only the repaired portions of a vehicle, painters often have to mix paint to match the original color, which can be very difficult if the color has faded. To prepare a vehicle for painting, painters or their helpers use power sanders and sandpaper to remove the original paint or rust, and fill small nicks and scratches with body putty. They also remove or mask parts they do not want painted, such as chrome trim, headlights, windows, and mirrors.

Painters use a spray gun to apply several primer coats. They apply lacquer or enamel primers to vehicles with metal bodies and flexible primers to newer vehicles with plastic body parts. They select the spray gun nozzle best suited to the kind of paint being used and, if necessary, they adjust the air-pressure regulator to obtain the correct pressure. If the incorrect nozzle is used or if it is not adjusted properly, paint may run or go on too thinly. To speed drying, they may place the freshly painted vehicle under heat lamps or in a special infrared oven. After each coat of primer dries, they sand the surface to remove any irregularities and to help the next coat adhere better. Final sanding of the primers may be done by hand with a fine grade of sandpaper. A sealer is then applied and allowed to dry, followed by the final topcoat. When lacquer is used, painters or their helpers usually polish the finished surface after the final coat has dried; enamel dries to a high gloss and usually is not polished.

Working Conditions

Automotive painters work indoors and may be exposed to dangerous fumes from paint and paint-mixing ingredients. However, in most shops painting is done in special ventilated booths that protect the painters from these hazards. Painters also wear masks or respirators for additional protection. Painters must bend and stoop to reach all parts of the vehicle.

Employment

Automotive painters held about 36,000 jobs in 1982. Almost three-fourths worked in shops that specialize in automotive repairs. Most others worked in the repair shops of automobile and truck dealers. Some painters worked for organizations that maintain and repair their own fleets of motor vehicles, such as trucking companies and buslines.

Painters are employed throughout the country, but are concentrated in metropolitan areas.

Training, Other Qualifications, and Advancement

Most automotive painters start as helpers and gain their skills informally by working with experienced painters. Beginning helpers usually remove trim, clean and sand surfaces to be painted, mask surfaces that they do not want painted, and polish finished work. As helpers gain experience, they progress to more complicated tasks, such as mixing paint to achieve a

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good match and using spray guns to apply primer coats or final coats to small areas. Becoming skilled in all aspects of automotive painting usually requires 3 to 4 years of on-the-job training.

Instructional programs in automotive painting are offered at a small, but growing number of community and junior colleges and vocational and technical schools. Completion of such a program is an asset to persons seeking to enter this occupation. The quality of formal automotive painting programs varies greatly, however. Better programs provide a thorough background in the latest automotive painting technology, such as the use of acrylic paints, and include substantial practical experience essential to becoming proficient as an automotive painter.

A few automotive painters learn through apprenticeship. Apprenticeship programs, which generally last 3 years, consist of on-the-job training supplemented by formal instruction in areas such as shop safety practices, proper use of equipment, and blending colors. However, like other automotive service occupations, employers' interest in apprenticeship is declining due to the increasing number of effective vocational training programs.

Painters should have good health, keen eyesight, and a good color sense. Courses in automobile-body repair offered by high schools and vocational schools are helpful. Completion of high school generally is not required but usually is an advantage.

Voluntary certification by the National Institute for Automotive Service Excellence is recognized as the standard of achievement for automotive painters. For certification, painters must pass a written examination and have at least 2 years of experience in the field. High school, trade or vocational school, or community or junior college training in automotive painting and refinishing may substitute for up to 1 year of experience. Certified painters must retake the examination at least every 5 years.

An experienced automotive painter with supervisory ability may advance to shop supervisor. Many experienced painters open their own shops.

Job Outlook

Employment of automotive painters is expected to grow faster than the average for all occupations through the mid-1990's, as the number of cars, trucks, and buses damaged in traffic accidents increases with the motor vehicle population. Painters also will be needed to repaint older vehicles which have rust or faded paint.

Despite projected faster-than-average growth in employment, most job openings are expected to arise each year as experienced painters transfer to other occupations, retire, or stop working for other reasons. Job opportunities will be best in heavily populated areas.

Experienced automotive painters can expect relatively steady work because the automotive painting business is not significantly affected by changes in economic conditions. Regardless of the state of the economy, automobiles damaged in accidents require repair and refinishing. However, there may be fewer openings for persons seeking to enter this occupation during recessions.

Automotive painters wear masks or respirators for protection from dangerous fumes.

Earnings

Experienced painters employed by automobile dealers in 24 large metropolitan areas had average hourly earnings of $12.81 in 1982. Their average hourly earnings varied by region as follows:

West	$13.71
North Central	13.26
South	12.57
Notheast	9.57

Beginning apprentices usually start at about half the hourly rate of fully qualified painters. As they progress, their wages gradually approach those of experienced automotive painters. Helpers start at lower wage rates.

Many painters employed by automobile dealers and independent repair shops receive a commission based on the labor cost charged to the customer. Under this method, earnings depend largely on the amount of work a painter does and how fast it is completed. Employers frequently guarantee commissioned painters a minimum weekly salary. Helpers and apprentices usually receive an hourly rate until they become sufficiently skilled to work on a commission basis. Trucking companies, buslines, and other organizations that repair their own vehicles usually pay by the hour. Most painters work 40 hours a week.

Many automobile painters belong to unions, including the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the Sheet Metal Workers' International Association; and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America (Ind.). Most union painters work for the larger automobile dealers, trucking companies, and buslines.

Related Occupations

Restoring damaged motor vehicles often involves repair of their bodies and mechanical components as well as painting. Automotive painters often work closely with the following related automotive service occupations: Automotive repair service estimators, automotive body repairers and customizers, automotive mechanics, and diesel mechanics.

Sources of Additional Information

For more details about work opportunities, contact local automotive-body repair shops and automotive dealers; locals of the unions previously mentioned; or the local office of the State employment service. The State employment service also may be a source of information about apprenticeship and other training programs.

For general information about the work of automotive painters, write to:

Automotive Service Industry Association, 444 North Michigan Ave., Chicago, Ill. 60611.

Automotive Service Councils, Inc., 188 Industrial Dr., Suite 112, Elmhurst, Ill. 60126.

Information on how to become a certified automotive painter is available from:

National Institute for Automotive Service Excellence, 1825 K St. NW., Washington, D.C. 20006.

Welders and Flamecutters

(D.O.T. 81 exc. 819.281-018 and .687-010)

Nature of the Work

Welding is the most common way of permanently joining metal parts. Typically, heat is

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applied to the metal pieces to be joined; the parts are melted and fused to form a permanent bond. Because of its strength, welding is used to construct and repair parts of ships, automobiles, spacecraft, and thousands of other products. Welding is also used to join beams and steel reinforcing rods in buildings, bridges, and highways.

There are three common ways to create the heat that is applied to the parts being joined. In electric arc welding, the most frequently used process, heat is created as electric current flows through an arc between the tip of the welding electrode and the metal. In resistance welding, heat is created in the weld metal as current flows through the metal. In gas welding, the flame from the combustion of burning gases melts the metal. In arc and gas welding, filler materials, called welding electrodes or welding rods, are melted and added to the weld puddle to fill the joint, giving it greater strength. The welder controls the amount of heat and the size of the melted area and adds the proper amount of filler material to form a strong joint.

Since welding processes differ and are used for many purposes, the equipment and skill levels of welders vary. Some jobs require highly skilled manual welders who know how to safely use gas and electric arc welding equipment in all positions and are able to plan their work from drawings or specifications. Skilled welders know the characteristics and properties, such as melting points, of steel, aluminum, and other commonly used metals. Examples of skilled welders are maintenance welders; pressure vessel welders, such as those working on submarines or nuclear reactors; pipe welders; and welders who construct ships and bridges.

In ship construction, welders join the steel plates, beams, and pipes. Some joints to be welded are on the floor (deck), some are on the walls, and some are overhead. Each must be carefully welded to insure that the ship will not break apart in rough seas.

Ship welders generally use manual arc welding equipment, although semiautomatic equipment is becoming more widely used. After welders read instructions regarding which materials and welding method to use, they obtain supplies from the storage area. To form a joint by arc welding, they use an electrode in a holder attached to an electrical cable coming from a welding power supply. Another cable is attached to the metal being welded. Thus, electricity will flow through the welding electrode, through the arc to the metal being welded, and back to the power supply. The power supply can be adjusted to provide the correct amount of current. When the power is turned on, welders "strike an arc" by briefly touching the electrode to the metal to start the electricity flowing and then pulling the rod back to form a small arc gap through which the current must flow. If the distance between the electrode and the metal is correct, a stable electric arc will bridge the space; the heat from the arc melts the electrode and the metal. Welders move the arc along the length of the joint. As the electrode melts and becomes shorter, they move the holder closer to the metal to keep the right distance from the arc. They replace very short electrodes with new ones.

Job prospects for welders are better in some industries than in others.

Maintenance welders repair tools, machines, and equipment. Often they bring portable gas torches, hoses, and tanks to the job because electricity may not be available.

When working on a broken pipe, for example, maintenance welders examine the pipe and prepare the break for repair. They then select a welding filler rod appropriate for the job. Next, they light the torch and adjust regulators on the cylinders of fuel gas, such as acetylene, and oxygen to obtain the right gas mixtures and flame. Then they heat the edges of the break with the torch. As the metal begins to soften, welders melt the end of the filler rod in the hot liquid metal as they carefully move the torch and rod along the break. Welders must keep the torch the correct distance from the metal, apply heat correctly, and repair the break with filler material.

Not all welders need the skills required of shipbuilding or maintenance welders. In factories where many identical parts need to be welded, automatic arc, electron beam, or resistance welding machines are used. Workers who operate such machines to weld automobile mufflers and washing machines, for example, need little knowledge of welding. These workers, frequently called welding machine operators to distinguish them from more skilled, manual welders, place the parts to be joined in fixtures on the machine and push a button. The machine then clamps the part in place and positions it, as necessary, to complete the welding cycle. In applications having a high volume of repetitive welds, however, manufacturers increasingly are replacing welding machine operators with robot welders.

The work of arc and flame cutters is closely related to that of welders. Using heat from burning gases or an electric arc, cutters cut and trim rather than join metal. Some electrically and mechanically operated machines follow guidelines automatically.

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Working Conditions

Welders frequently are exposed to potential hazards. They use protective clothing, safety shoes, goggles, helmets with protective lenses, and other devices to prevent burns and eye injuries. Although lighting and ventilation usually are adequate, some metals give off toxic gases and fumes as they melt. Workers often are in contact with rust, grease, and dirt on metal surfaces. Machine operators, however, are largely free from hazards associated with manual welding. A face shield or goggles generally are adequate protection. Skilled welders, working in booths, are often isolated for long periods.

Employment

Welders and flamecutters held about 490,000 jobs in 1982. Three out of five jobs involve the manufacture of durable goods; for example, boilers, bulldozers, trucks, ships, and consumer appliances such as refrigerators. Most of the rest are in metal products repair or in construction of bridges, large buildings, and pipelines.

Welders are concentrated in manufacturing centers such as the Great Lakes States—Pennsylvania, Ohio, Michigan, Indiana, and Illinois. The rest are distributed much the same as the population, with large numbers in New York, Texas, Wisconsin, and California.

Training, Other Qualifications, and Advancement

Although it takes several years of on-the-job training to become a skilled welder, less skilled work can be learned in a few months or less. Some welding operators learn to operate a machine in a few hours and can handle all aspects of the job within a week.

High schools, vocational-technical institutes, and community colleges throughout the country teach entry level welding skills. Private vocational schools also teach welding, in courses that take from 6 months to 1 year to complete. The Armed Forces operate welding schools as well. Many welders learn their craft through informal, on-the-job instruction while they work as welders' helpers. A few companies operate welding schools, although these programs usually teach advanced techniques to qualify welders for work on critical applications such as nuclear reactors or high pressure boilers.

All these programs train manual welders. Welders who operate automatic welding machines can usually be trained on the job in a matter of hours or days. Management in many manufacturing plants select capable assemblers or other workers to fill openings for welding machine operators.

Persons considering work as welders or cutters need manual dexterity, good eyesight, and good eye-hand coordination. They should have the ability to concentrate on detailed work for long periods and be physically able, in order to bend, stoop, and work in awkward positions. Most employers prefer applicants who have high school or vocational school training in welding. Courses in shop mathematics, mechanical drawing, blueprint reading, physics, and chemistry also are helpful.

New technological developments, especially in the nuclear energy and aerospace fields, sometimes create new welding applications. Because of the hazards of nuclear power plants and of air and space travel, reliability standards in both industries are very high. Before working on buildings, bridges, pipelines, and other jobs where the strength of the weld is highly critical, welders may have to pass an examination given by an employer or government agency to become "certified welders." On the negative side of the ledger, technology is eliminating some welding operations as robots become more economical.

Promotion opportunities for most welding machine operators are limited, although some eventually learn skilled welding jobs. Skilled welders, by contrast, may be promoted to welding inspectors, technicians, or supervisors. Experienced workers who have obtained college training are in great demand as welding engineers to develop new applications for welding. A small number of experienced welders open their own repair shops.

Job Outlook

Employment of welders is expected to increase as fast as the average for all occupations through the mid-1990's. Some of this growth will reflect a rebound of employment to the levels before the 1981-82 recession. Increases in population and income are expected to stimulate demand for buildings, heavy machinery, and thousands of other products that welders help make. The rate of expansion in the industries that produce those goods will determine the actual increase in the number of welders. Most openings, however, will arise because of the need to replace experienced welders who transfer to other occupations or retire.

Welders and flamecutters are vulnerable to periodic layoffs for factory retooling, and to economic downturns. During the 1981-82 recession, at least half of all those who left the occupation became unemployed. Many of these workers are skilled and form a pool of potential reentrants who will resume working as jobs become available. Thus, although many openings for welders are expected through the mid-1990's, those seeking a first job may encounter considerable competition from experienced welders who are unemployed. Furthermore, employers tend to fill vacancies for machine welders from the ranks of company employees such as assemblers or helpers. Those who have recently completed vocational training programs in welding will fill some openings, although graduates of these programs don't always become welders. Welding skills are applicable in many occupations.

Job opportunities through the mid-1990's are not expected to be equally favorable for all kinds of welders. The robot welding systems that are being introduced on manufacturing lines are eliminating the jobs of welding machine operators, although their full effect will depend on how rapidly and extensively the new technology is adopted. For many machine welding occupations, automation is likely to slow employment growth in the coming years. Highly skilled welders are not expected to be affected by automation for the foreseeable future, however, and could experience sharply increased demand if nuclear power regains favor or if synthetic fuels become economical. Job openings are expected to vary geographically, too; the best prospects will be in the Sunbelt and Western States.

Earnings

Median earnings for welders working full time were about $334 a week in 1982. The middle 50 percent earned between $250 and $425 a week. The lowest-paid tenth earned less than $200 a week; the highest more than $575.

The limited wage data available indicate that welding machine operators earned from $10 to $11 an hour in 1982. Welders in the construction industry earned $12 to $13 an hour, depending on location.

Welders belong to many different unions. Among these are the International Association of Machinists and Aerospace Workers; the International Brotherhood of Boilermakers, Iron Shipbuilders, Blacksmiths, Forgers and Helpers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada; and the United Electrical, Radio and Machine Workers of America.

Related Occupations

Welders are highly skilled workers who must be very familiar with the properties of metal and who use hand-held equipment or machines to do factory or construction work. Other people with similar duties are blacksmiths, forge shop workers, all-round machinists, machine tool operators, tool-and-die makers, millwrights, sheet-metal workers, and boilermakers.

Sources of Additional Information

A list of postsecondary programs in welding and cutting, arranged by city and State, may be found in *Postsecondary Schools with Occupational Programs, 1982*, a publication of the U.S. Department of Education's National Center for Education Statistics. This publication may be available in counseling centers and large public libraries.

For information on training opportunities and jobs for welders in your community, contact local employers or the local office of the State employment service.

The American Welding Society has prepared a pamphlet, *Focus on Your Future*, which describes training and work opportunities. Send 35 cents per copy to:

The American Welding Society, 550 NW., LeJeune Rd., Miami, Fla. 33126.

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OTHER PRODUCTION OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Automobile seat cover, and top installers	Fit and install automobile seat covers and convertible or vinyl tops.	'5,900	Faster than average
Bakers	Mix and bake ingredients according to recipes to produce breads, pastries, and other baked goods. Goods are produced in large quantities for sale through establishments such as grocery stores. Generally high volume production equipment is used.	65,000	More slowly than average
Cabinetmakers	Cut, shape, and assemble wooden articles, such as store fixtures, office equipment, cabinets, and highgrade furniture. Set up and operate a variety of machines, such as power saws, jointers, mortisers, tenoners, molders, and shapers to cut and shape parts from wood stock.	78,000	About as fast as average
Dressmakers, except factory	Make, alter, and repair garments, such as coats, corsets, dresses, or skirts according to pattern or customer specifications, using sewing machines or by hand sewing.	61,000	More slowly than average
Electroplaters	Set up, operate or tend plating equipment to coat metal or plastic objects electrolytically with metal to provide protective or decorative surfaces or to build up worn surfaces. Work may involve pickling or other cleaning of the object in preparation for electrolysis.	32,000	More slowly than average
Etchers and engravers	Engrave and etche metal, wood, rubber, glass, or other materials by hand or machine for printing, identification, or decorative purposes. May tend equipment that electrolytically etches markings.	12,000	About as fast as average
Forging press operators	Set up and operate or tend closed-die power presses to produce metal forgings, following work order specifications and using measuring instruments and hand tools.	7,000	About as fast as average
Furnace operators and cupola tenders	Operate or control gas, oil, coal, electric arc, electric induction, oxygen, open-hearth, cupola or other furnace to melt or refine ore, metal, additives, or scrap prior to casting.	13,000	More slowly than average
Furniture finishers	Finish or refinish damaged, worn, or used furniture or new high-grade furniture to specified color or finish, utilizing knowledge of wood properties, finishes, and furniture styling.	19,000	About as fast as average
Heat treaters, annealers, and temperers	Control heat-treating furnaces and quenching equipment to alter physical and chemical properties of metals by methods of controlled heating and cooling, such as hardening, tempering, annealing, case hardening, and normalizing.	23,000	Little change is expected
Inspectors	Inspect parts, products or materials before, during, or after processing. Perform such operations as examining parts, products or materials for flaws and defects; checking their dimensions and appearance to determine whether they meet the required standards and specifications.	410,000	About as fast as average
Laundry, drycleaning, and pressing machine operatives	Operate machines that launder or dryclean clothing, rugs, and linens. May specialize cleaning items such as furs or leather garments.	159,000	More slowly than average
Loom fixers	Set up, adjust, and repair looms to weave cloth of specified quality and design, using knowledge of loom function and weaving, diagrams, and manuals.	13,000	Expected to decline
Meat cutters and butchers	Split carcasses; cut, trim, and bone meat. May also clean and bone fish and poultry.	57,000	More slowly than average
Mixing operatives	Operate machines to blend ingredients for products such as paint, clay, candy, or sausage. May follow formulas to determine amounts of different ingredients needed.	41,000	More slowly than average
Motion picture projectionists	Set up and operate motion picture projection and sound-reproducing equipment to produce coordinated effects on screen.	17,000	Expected to decline

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OTHER PRODUCTION OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Packing and inspecting operatives	Package products by hand or machine. May inspect, clean, and sort articles before they are packaged.	844,000	More slowly than average
Painters, manufactured articles	Use equipment such as spraying machines to coat products with paint or other finishes. May check finished items for defects and adjust machines.	150,000	About as fast as average
Pourers, metal	Pour molten metal from ladles into molds to produce metal castings or ingots. Skim slag off molten metal, using straining devices. May repair ladle. May move ladle from furnace or cupola to work station.	12,000	Faster than average
Power station operators	Control central switchboards in electric generating plants to distribute power output among generators according to generator capacities and changing power demands, and regulate flow and distribution of power from generators to outgoing powerlines.	16,000	More slowly than average
Riveters, light	Set up, operate, or tend riveting machines that rivet together parts fabricated from materials such as sheet metal, plastic, cloth, or leather using light-duty riveting machines, portable riveting guns, or rivet sets and hammers.	10,000	About as fast as average
Sandblasters and shotblasters	Tend equipment that cleans dirt, scale or other materials from metal or other hard-composition objects with blast of abrasive, such as steel shot, sand, or steel grit.	10,000	About as fast as average
Sawyers	Operate machines used to saw wood, metal, and other materials to size. May measure and mark materials to be cut.	75,000	About as fast as average
Sewers and stitchers	Operate machines used to sew together materials such as garments, quilts, upholstery.	804,000	More slowly than average
Shipfitters	Lay out and fabricate metal structural parts, such as plates, bulkheads, and frames, and brace them in position within hull or ship for riveting or welding. May prepare molds and templates for fabrication of nonstandard parts.	18,000	About as fast as average
Tailors	Design and make garments such as suits and coats, applying principles of garment construction and styling. May specialize in altering clothing to fit individual customers or repairing defective garments.	63,000	Faster than average
Testers	Perform tests on parts, products or materials before, during, or after processing to determine whether the operation and characteristics meet required standards and specifications.	116,000	Faster than average
Textile operatives	Includes workers involved in operating and tending textile manufacturing equipment such as machines used for winding, twisting, knitting, and weaving.	294,000	More slowly than average
Upholsters	Pad, cover, trim and sew materials in the manufacture of furniture or vehicles seats using hand tools and knowledge of upholstery methods and fabrics. Install material on inside of arms, back, and seat, and over outside back and arms of frame.	16,000	About as fast as average
Wood machinists	Set up and operate variety of woodworking machines to surface, cut, and shape lumber, and to fabricate parts for wood products, such as door and window frames, furniture, and sashes, according to specifications.	21,000	Faster than average

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Transportation and Material Moving Occupations

People in transportation and material moving occupations operate trucks, buses, taxicabs, trains, ships, aircraft, and industrial equipment that moves people and materials. Although they are employed in all industries, workers in these occupations are concentrated in the transportation industry.

Most employers prefer to hire high school graduates for these jobs, but persons who have not completed high school are often hired if they meet all other qualifications. For some occupations, vocational or technical training or some college education is an advantage. The ability to understand and follow complex operating rules, procedures, and instructions is an important requirement for most of these jobs. Busdrivers, for example, must adhere to detailed schedules, routes, and operating procedures, and airplane pilots must painstakingly follow complex checkout instructions before takeoff to insure that their craft is in proper operating condition. During operation, they follow procedures to insure the safety of lives and property.

Although work in these occupations generally is not strenuous, much is tedious or stressful. Coordination and manual dexterity are vital. Some mechanical aptitude is needed to recognize when a vehicle, bulldozer, or industrial truck is not operating properly. For many workers in these occupations, such as taxicab drivers, the efficiency with which they perform their work directly affects their earnings.

Good vision, usually with or without glasses, and ability to judge distances are basic requirements for transportation and material moving occupations. Good color perception is also required for many of these jobs. Regular physical examinations are required for most jobs to insure that individuals have not developed chronic medical conditions that could adversely affect their performance. Good health is vital in order to handle stress for prolonged periods of time, whether driving a taxicab through city traffic all day, or operating a crane at a high-rise construction site where a misjudgment of distance could dislodge fellow workers from their precarious perches.

Many transportation and material moving occupations are closely regulated. Most motor vehicle operators need a chauffeur's license and frequently must adhere to extensive regulations. Special operating certificates are also needed to be employed as an airplane pilot or a merchant marine officer.

More detailed information on selected transportation and material moving occupations appears in the statements that follow.

Airplane Pilots

(D.O.T. 196 except .167-014 and .263-038)

Nature of the Work

Pilots are skilled, highly trained professionals who fly planes to carry out a wide variety of tasks. Most pilots transport passengers and cargo, while others perform tasks such as crop dusting, testing aircraft, and taking photographs.

Except on small aircraft, two pilots usually are needed to fly the plane. Generally, the most experienced pilot (called captain by the airlines) is in command and supervises the other crew members on board. The copilot assists in communicating with air traffic controllers, monitoring the instruments, and flying the plane. Most large airliners have a third pilot in the cockpit who serves as flight engineer. The flight engineer assists the other pilots by monitoring and operating many of the instruments and systems, making minor inflight repairs, and watching for other aircraft.

Before departure, pilots plan their flights carefully. They confer with dispatchers and weather forecasters to find out about weather conditions en route and at their destination. Based on this information, they choose a route, altitude, and speed that should provide the fastest, safest, and smoothest flight. When flying under instrument flight rules, the pilot in command must file an instrument flight plan with air traffic control so that the flight can be coordinated with other air traffic.

Before taking off, pilots thoroughly check their planes to make sure that the engines, controls, instruments, and other systems are functioning properly. They also make sure that baggage or cargo has been loaded correctly.

Takeoff and landing are the most difficult parts of the flight and require close coordination between the pilot and copilot. For example, as the plane accelerates for takeoff, the pilot concentrates on the runway while the copilot scans the instrument panel. To calculate the speed they must attain to become airborne, pilots consider the altitude of the airport, outside temperature, weight of the plane, and the speed and direction of the wind. The moment the plane reaches this speed, the copilot informs the pilot, who then pulls back on the controls to raise the nose of the plane.

Unless the weather is bad, the actual flight is relatively easy. Pilots steer the plane along their planned route and are monitored by the air traffic control stations they pass along the way. They continuously scan the instrument panel to check their fuel supply and the condition of their engines. Pilots may request a change in altitude or route if circumstances dictate. For example, if the weather briefing led the pilots to expect a smoother ride than is being experienced, they may ask air traffic control if pilots flying at other altitudes have reported better conditions. If so, they may request a change. This procedure also may be used to find a stronger tailwind or a weaker headwind to save fuel and increase speed.

If visibility is poor, pilots must rely completely on their instruments. Using the readings on the altimeter, they know how high above ground they are and can fly safely over mountains and other obstacles. Special navigation radios give pilots precise information which, with the help of special maps, tells them their exact position. Other very sophisticated equipment provides directions to a point just above the end of a runway and enables pilots to land completely "blind."

Once on the ground, pilots must complete records on their flight for their company and the Federal Aviation Administration (FAA).

Airline pilots have the services of large support staffs and consequently perform few nonflying duties. Pilots employed by businesses that use their own aircraft, however, usually are the businesses' only experts on flying and consequently have many other duties. They may load the plane and handle all passenger luggage to insure a balanced load, and supervise refueling. Other nonflying responsibilities include keeping records, scheduling flights, arranging for major maintenance, and performing minor maintenance and repair work on their planes.

Some pilots are instructors. They teach their students the principles of flight in groundschool classes and demonstrate how to operate aircraft in "dual-controlled" planes.

A few specially trained pilots employed by the airlines are "examiners" or "check pilots." They periodically fly with each airline pilot and copilot to make sure that they are proficient.

Working Conditions

By law, airline pilots cannot fly more than 85 hours a month or more than 1,000 hours a year. Most airline pilots actually fly less than 70 hours a month and, although they have additional nonflying duty hours, usually only work 16 days a month. However, the majority of flights involve layovers away from home. When pilots are away from home, the airlines provide hotel accommodations and an allowance for expenses. Airlines operate flights

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at all hours of the day and night, so work schedules often are irregular. Pilots who have little seniority may be assigned night or early morning flights.

Pilots employed outside the airlines often have irregular schedules; they may fly 30 hours one month and 90 hours the next. Since these pilots frequently have many nonflying responsibilities, they have much less free time than airline pilots. Except for business pilots, most pilots employed outside the airlines do not remain away from home overnight. They may work odd hours, however. Instructors, for example, often give lessons at night or on weekends.

Airline pilots, especially those on international routes, often suffer jet lag—disorientation and fatigue caused by many hours of flying through different time zones. The work of test pilots, who check the flight performance of new and experimental planes, may be dangerous. Pilots who are crop dusters may be exposed to toxic chemicals and often do not have the benefit of a regular landing strip.

Although flying does not involve much physical effort, the mental stress of being responsible for a safe flight, no matter what the weather, can be tiring. Particularly during takeoff and landing, pilots must be alert and quick to react if something goes wrong.

Before takeoff, pilots ensure that all equipment and controls are functioning properly.

Employment

Civilian pilots held about 80,000 jobs in 1982. Nearly one-half worked for the airlines. Many others worked as flight instructors at local airports or for large businesses that use their own airplanes to fly company cargo and executives. Some pilots flew small planes for air taxi companies, usually to or from lightly traveled airports not serviced by the airlines. Others worked for a variety of businesses performing tasks such as crop dusting, inspecting pipelines, or conducting sightseeing trips. Federal, State, and local governments also employed pilots. Several thousand pilots were self-employed.

Training, Other Qualifications, and Advancement

All pilots who are paid to transport passengers or cargo must have a commercial pilot's license issued by FAA. To qualify for this license, applicants must be at least 18 years old and have at least 250 hours or more of flight experience. They also must pass a strict physical examination to make sure that they are in good health and have 20/20 vision with or without glasses, good hearing, and no physical handicaps that could impair their performance. Applicants must pass a written test that includes questions on the principles of safe flight, navigation techniques, and FAA regulations. They also must demonstrate their flying ability to FAA examiners.

In addition to a commercial license, pilots who have to fly in bad weather must be licensed by the FAA to fly by instruments. Pilots may qualify for this license by having 40 hours of experience flying by instruments, passing a written examination on procedures and FAA regulations covering instrument flying, and demonstrating their ability to fly by instruments.

Airline pilots must fulfill additional requirements. They must pass FAA written and flight examinations to earn a flight engineer's license. Captains must have an airline transport pilot's license. Applicants for this license must be at least 23 years old and have a minimum of 1,500 hours of flying experience including night and instrument flying.

All licenses are valid as long as a pilot can pass the required physical examinations and the periodic tests of flying skills demanded by government and company regulations.

Flying can be learned in military or civilian flying schools. Either kind of training satisfies the flight experience requirements for licensing. The FAA has certified about 1,325 civilian flying schools, including some colleges and universities that offer degree credit for pilot training. Military pilots gain substantial experience on jet aircraft, which airlines and many businesses prefer. Having lost many pilots to the airlines in recent years, the Armed Forces are offering financial incentives to curb the high rate of attrition. If more pilots choose to stay in military flying, the airlines may be forced to hire a higher percent of general aviation pilots who are inexperienced in flying jet aircraft.

Pilots hired by airlines must be high school graduates; however, most airlines require 2 years of college and prefer to hire college graduates. In fact, most entrants to this occupation have a college degree. Because pilots must be able to make quick decisions and accurate judgments under pressure, airline companies reject applicants who do not pass required psychological tests.

New airline pilots usually start as flight engineers. Although airlines favor applicants who already have a flight engineer's license, they may train those who have only the commercial license. All new pilots receive several weeks of intensive training in simulators and classrooms before being assigned to a flight.

Companies other than airlines generally do not require as much flying experience. However, a commercial pilot's license is required, and companies prefer applicants who have experience in the type of plane they will be flying. New employees generally start as copilots. Test pilots often are required to have an engineering degree.

Advancement for all pilots generally is limited to other flying jobs. Many pilots start as flight instructors, building up their flying hours while they earn money teaching. As they become more experienced, these pilots occasionally fly charter planes and perhaps get jobs with small air transportation firms, such as air taxi companies. Some advance to business flying jobs. A small number get flight engineer jobs with the airlines.

In the airlines, advancement usually depends on seniority provisions of union contracts. After 5 to 10 years, flight engineers advance according to seniority to copilot and, after 10 to 20 years, to captain. Seniority also determines which pilots get the more desirable routes. In a nonairline job, a copilot may advance to pilot and, in large companies, to chief pilot in charge of aircraft scheduling, maintenance, and flight procedures.

Job Outlook

Competition for job openings should be keen because the number of qualified pilots seeking jobs is expected to exceed the number of openings. Because wages are lower outside the airlines, there is not as much competition for these jobs. Still, flying is a popular activity, so there usually are more applicants than openings even for these positions.

College graduates who have experience flying jet aircraft and who have a commercial

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pilot's license and a flight engineer's license can expect first consideration for jobs with the major airlines. Businesses generally have fewer formal education and experience requirements than airlines. However, these companies prefer applicants with experience in the type of plane they will be flying on the job.

Employment of pilots is expected to increase about as fast as the average for all occupations through the mid-1990's. The expected growth in airline passenger and cargo traffic will create a need for more airliners, more pilots, and more flight instructors. Businesses are expected to operate more planes and employ more pilots to fly passengers and cargo to the increased number of locations that the scheduled airlines do not service.

Airplane pilots understandably have a strong attachment to their occupation since it requires a substantial investment in specialized training and offers very high earnings. A relatively small proportion of pilots leave the occupation each year. Nevertheless, most job openings are expected to result from the need to replace pilots who retire or stop working for other reasons.

Employment of pilots is sensitive to cyclical swings in the economy. During slow periods, when a decline in the demand for air travel forces airlines to curtail the number of flights, airlines may furlough some pilots. Commercial and corporate flying, flight instruction, and testing of new aircraft also decline during recessions, adversely affecting pilots employed in those areas.

Earnings

Earnings of airline pilots are among the highest in the Nation. In 1982, the average salary for airline pilots was about $75,000 a year. Starting salaries for flight engineers averaged about $16,000 a year, while some senior captains on the largest aircraft earned as much as $120,000. Earnings depend on factors such as the type, size, and maximum speed of the plane, and the number of hours and miles flown. Extra pay is given for night and international flights.

Generally, pilots working outside the airlines earn lower salaries. According to a survey conducted by the National Business Aircraft Association, median salaries for chief pilots ranged from about $36,000 to $48,000 a year in 1982; for captains/pilots, $39,000 to $54,000 a year; and for copilots, $23,000 to $29,000 a year. Usually, pilots who fly jet aircraft earn higher salaries than non-jet pilots.

Airline pilots generally are eligible for life and health insurance plans financed by the airlines. They also receive retirement benefits and, if they fail the FAA physical examination, disability payments. Some airlines provide allowances to pilots for purchasing and cleaning their uniforms. As an additional benefit, pilots and their immediate families usually are entitled to reduced fare transportation on their own and other airlines.

Most airline pilots are members of the Airline Pilots Association, International. Those employed by one major airline are members of the Allied Pilots Association. Many flight engineers are members of the Flight Engineers' International Association.

Related Occupations

Helicopter pilots need skills and perform duties similar to those of airplane pilots. Although they are not in the cockpit, air traffic controllers and dispatchers also play an important role in making sure flights are safe and on schedule, and participate in many of the decisions pilots must make.

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 airline. Addresses of airline companies are available from:

Air Transport Association of America, 1709 New York Ave. NW., Washington, D.C. 20006.

For information about the duties as well as the physical and educational requirements for airline pilots and flight engineers, request *Pilots and Flight Engineers*, publication GA-300-122 (include a self-addressed mailing label), from:

U.S. Government Printing Office, Library and Statutory Distribution Service, 5208 Eisenhower Ave., Alexandria, Va. 22304.

For information on airline pilots, contact:

Airline Pilots Association, 1625 Massachusetts Ave. NW., Washington, D.C. 20036.

For a copy of *List of Certificated Pilot Schools*, write to:

U.S. Department of Transportation, Publications Section, M-443.1, Washington, D.C. 20590.

For information about job opportunities in companies other than airlines, consult the classified section of aviation trade magazines and apply to companies that operate aircraft at local airports.

Busdrivers

(D.O.T. 913.363-010 and .463-010)

Nature of the Work

Busdrivers provide transportation for millions of Americans every day. Intercity busdrivers operate buses that enable the public to travel between communities and metropolitan areas. Local transit busdrivers provide public transportation within a metropolitan area. School busdrivers transport pupils to and from schools. They follow definite time schedules and routes over highways and city and suburban streets to provide passengers with an alternative to the automobile and other forms of transportation.

The workday for busdrivers begins when they report to their assigned terminal or garage. At the garage, intercity and local transit busdrivers are given tickets, transfers, and refund and trip report forms. Drivers may check their vehicle's tires, brakes, windshield wipers, lights, oil, fuel, and water, and make certain that their buses are carrying safety equipment, such as fire extinguishers, first aid kits, and emergency reflectors. They then drive to the start of their runs.

On most runs, drivers pick up and discharge passengers at bus stops or stations. As passengers board the bus, intercity and local transit busdrivers collect the correct cash fare, token, or ticket or make sure that a valid pass is presented. They also collect or issue transfers. Drivers often answer questions about schedules, routes, and transfer points and sometimes announce stops and other information concerning trips.

Busdrivers' days are run by the clock, as they must pay special attention to their complicated schedules. Although drivers may run late when traffic is heavier than average, they do not let light traffic put them ahead of schedule so that they miss passengers.

Busdrivers must always be alert to prevent accidents, especially when driving in traffic or under adverse road and weather conditions. School busdrivers must exercise particular caution when children are boarding or leaving the bus. Busdrivers must operate the bus at safe speeds while trying to keep schedules. Since sudden stops or swerves jar standing passengers, drivers try to anticipate traffic developments, not react to them.

Drivers' routes vary. Local transit busdrivers may make several trips each day over the same city and suburban streets, stopping as frequently as every few blocks to pick up and discharge passengers. School busdrivers also drive the same routes each day, stopping frequently to pick up pupils in the morning and reversing direction in the afternoon to return them to their homes. Intercity busdrivers may make only a single one-way trip to a distant city or a round trip each day, stopping at stations at many small towns only a few miles apart or at large cities hundreds of miles apart. Drivers who operate chartered buses pick up a group of people, take them to the group's destination, and generally remain with them until they return. These trips frequently require drivers to remain away from home one night or more. School busdrivers occasionally transport students and teachers on field trips during the day, or athletes and students to games in the evening.

At the end of each day, busdrivers turn in trip reports with a record of tickets and fares received, trips made, and significant delays in schedule. As required by the U.S. Department of Transportation, intercity drivers keep a current record on each trip of the distances traveled and the periods of time they spend driving, performing other duties, and off duty. Busdrivers also turn in a report on the mechanical condition of their bus. In case of an accident, drivers must prepare a report describing exactly what happened and obtain the names, addresses, and phone numbers of persons on the bus.

Working Conditions

Driving a bus through heavy traffic while dealing with passengers is not physically strenuous, but it may cause nervous strain and fatigue. The

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busdriver is given a great deal of independence on the job and is solely responsible for the safety of the pissengers and the bus. Many drivers like working without direct suoervision and take pride in assuming these responsibilities. Some also enjoy the opportunity to meet the public.

Since intercity and transit buses operate at all hours every day of the year, drivers may work nights andnweekends. New drivers work only when called and must be ready to report for work at any hour on very short notice. Driving schedules of intercity busdsivers may range from 6 to 10 hours a day and from 3 1/2 to 6 days a week. However, U.S. Department of Transportation regulations specify that intercity drivers shall not drive more than 10 hours without having at least 8 consecutive hours off and shall not drive after being on duty for 15 hours without at least 8 hours off duty.

School busdrivers work only when school is in session, having off weekends, holidays, and summers. The majority work 20 hours a week or less, driving one or two morning and afternoon routes and having the middle of the day free. Drivers taking field or athletic trips may work additional hours. Drivers who also have midday kindergarten routes may work as many as 30 hours a week.

Regular local transit busdrivers usually have a 5-day workweek; Saturdays and Sundays are counted as regular workdays. Some drivers work evenings and after midnight. To accommodate the demands of commuter travel, many local trans/t busdrivers work "split shifts." For example, a driver may work from 6 a.m. to 10 a.m., and then return to work from 3 p.m. to 7 p.m. Drivers may receive extra pay for working split shifts.

Many transit busdrivers work during the morning and evening rush hours and are off during the middle of the day.

Employment

Busdrivers held about 473,000 jobs in 1982. Two out of three busdrivers work for school systems or companies that provide school bus services under contract, as shown in the accompanying chart. Most of the remainder work for local transit companies; intercity and charter buslines also employ many busdrivers.

Training, Other Qualifications, and Advancement

Three out of four persons entering busdriving take part-time jobs. Most have no more than a high school education. School busdriving provides few opportunities for full-time employment. In addition, many local transit and intercity busdrivers start on a part-time basis and are only able to increase their number of work hours as they acquire seniority. Nearly half of all persons entering busdriving are students or homemakers and others reentering the labor force. Students and homemakers seeking to supplement family income are attracted to the large number of part-time busdriving jobs that allow them adequate time for other activities while employed.

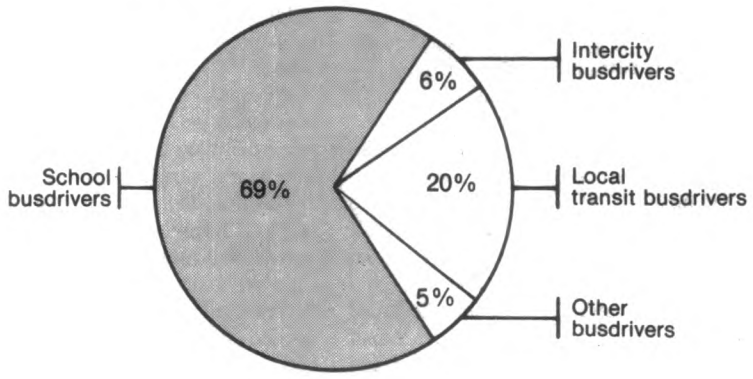
Busdrivers' qualifications are established by State and Federal regulations. Most States require that drivers have a chauffeur's license, which is a commercial driver's permit, or a special school bus license. In addition, intercity busdrivers must meet qualifications established by the U.S. Department of Transportation or a State agency, if the driver works only within one State.

Applicants for local transit and intercity busdriver positions should be at least 21 years old. School busdrivers must be at least 18 years old in most States, although a few States allow students as young as 16 to drive school buses. Busdrivers must be able to read, write, and speak English well enough to communicate with passengers and to tomplete reports. They should be in good health and have a good driving ricord. Busdrivers also must have at least 20/40 vision with or without glasses, good hearing, and normal use of their arms and legs. Many employerr prefer applicants who have a high school education or its equivalent. Most employers require applicants to pass a physical exomination and a written test of ability to follow complex bus schedules. In addition, intercity busdrivers must complete comprehensive written examinations which test their knowledge of Department of Transportation and State motor vehicle regulations, as well as a driving test in the type of busnthey will operate.

Many intercity bus companies have considerably highsr requirements. Most prefer applicants who are at least 24 years of age; some

Most busdrivers operate school buses.

Distribution of employment, 1982



SOURCE: Bureau of Labor Statistics

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prefer applicants who have bus or truck driving experience.

Since local transit and intercity busdrivers represent their companies in dealing with passengers, busdrivers must be courteous and tactful. All busdrivers need an even temperament and emotional stability because driving buses in heavy, fast-moving traffic and dealing with passengers can be a strain.

Most intercity bus companies and local transit systems give driver trainees 2 to 8 weeks of classroom and "behind-the-wheel" instruction. In the classroom, trainees learn U.S. Department of Transportation and company work rules, safety regulations, State and municipal driving regulations, and safe driving practices. They also learn to read schedules, determine fares, keep records, and deal tactfully and court/ously with passengers.

Many persons who enter school busdriving have never driven any vehicle larger than an automobile. Depending on their driving experience, school busdrivers receive up to 1 week of driving instruction. They also receive classroom training on State and local laws, regulations, and policies governing the operation of school buses; safe driving practices; driver-pupil relations; first aid; and fire emergency procedures. Before they are allowed to transport students, school busdrivers must pass driving and written tests and—in some States—a background investigation to determine if the trainee has a criminal record or a history of mental problems.

Many busdriver trainees learn and practice driving skills on set courses. They make turns and zig-zag maneuvers, back up, and drive in narrow lanes. As they gain experience, they drive on lightly traveled roads, eventually advancing to heavily congested highways and city streets. They also make trial runs, without passengers, to improve their driving skills and learn the routes. Because a busdriver is seated higher than other drivers, defensive driving—seeing and avoiding possible traffic dangers ahead of time—has much potential and is stressed. Local transit trainees often must memorize and drive each of the runs operating out of their assigned garage. After completing final driving and written examinations, new drivers begin a "break in" period. During this peeiod, they make regularly scheduled trips with passengers, often accompanied by an experienced driver who gives helpful tips, answers questions, and determines whether the new driver is performing satisfacrorily.

Most experienced intercity and local transit drivers have regularly scheduled runs. New drivers, however, usually are placed on an "extra" list to substitute for regular drivers who are ill or on vacation. Charter runs also are driven by extra list drivers. Extra list transit busdrivers also are assigned extra and special runs—for example, those during morning and evening rush hours and to the stadium the day of a sports event. And in cities that use transit buses to transport children to school, extra list drivers operate these buses. New drivers remain on the extra list until they have enough seniority to get a regular run. This may take several years.

Busdrivers select assignments in order of length of service, or seniority. Therefore, as drivers acquire seniority, they can choose runs they prefer, such as those that lead to a greater number of work hours, lighter traffic, weekends off, or in the case of intercity busdrivers, higher earnings or fewer workdays per week.

Opportunities for promotions generally are limited. However, experienced drivers may advance to jobs as supervisors or dispatchers. These workers assign buses to drivers, check whether drivers are on schedule, reroute buses to avoid a blocked street or other problems, and dispatch extra vehicles and service crews to scenes of accidents and breakdowns. A few drivers advance to management positions. Promotion in publicly owned bus systems is often by competitive civil service examination.

Job Outlook

Job openings for busdrivers are expected to be plentiful through the mid-1990's. Most openings will arise as experienced busdrivers transfer to other occupations or leave the labor force. Most new jobs will be found in areas with a growing population, such as many communities in the Sunbelt States.

Employment of busdrivers, overall, is expected to increase more slowly than the average for all occupations through the mid- 1990's. Employment of local transit busdrivers is expected to increase slowly as expansion of public transportation systems in growing communities is offset somewhat by the use of larger buses, shifting of riders to new subway and light rail systems, and falling ridership in areas with declining urban populations. However, in an effort to control costs in the face of peak rush hour demand, transit systems are increasingly likely to replace full-time drivers on split shifts with part-time drivers who only work during either the morning or afternoon rush hours.

Little change is expected in the employment of intercity busdrivers. Intercity passenger travel will grow as population and income increase, but bus travel is not expected to grow. Buses are a relatively inexpensive mode of intercity travel, but higher incomes and cheaper air fares will enable more people to travel by plane, which provides faster—although more expensive—service over long distances.

Employment of school busdrivers is expected to grow about as fast as average as population continues to shift from the cities to the suburbs, where few students can walk to school.

Persons seeking intercity and local transit busdriving jobs can expect to face competition, since the relatively high wages, even for part-time work, attract many applicants.

Full-time local transit busdrivers are rarely laid off during recessions because scheduled service still must be provided. However, part-time drivers may be laid off if bus ridership decreases, because fewer extra buses may be needed during rush hours. Seasonal layoffs are common. Many intercity busdrivers with little seniority, for example, are furloughed during the winter when regular schedule and charter business falls off, and school busdrivers do not work during the summer or school holidays.

Earnings

Median weekly earnings of busdrivers who worked full time were about $330 in 1982. The middle 50 percent earned between about $220 and $435 a week. The lowest 10 percent earned less than $165 a week, while the highest tenth earned more than $545 a week.

According to data compiled by the American Public Transit Association, local transit busdrivers in 25 cities with more than 1 million population had a median starting wage rate of $8.27 an hour in 1982, and a median top rate of $10.66 an hour; in cities with less than 100,000 population, drivers had a median starting rate of $6.32 an hour and a median top rate of $7.54 an hour. In most cities, drivers could reach the top rate in 2 or 3 years.

Based on data from the American Bus Association, intercity busdrivers had estimated average annual earnings of about $24,200 in 1982. Earnings of intercity busdrivers depend primarily on the number of miles they drive. Beginning drivers worked about 6 months out of the year and earned between $12,000 and $18,000, while many senior drivers who worked year-round earned more than $30,000.

According to an Educational Research Service, Inc. survey, school busdrivers employed by public school systems averaged $6.56 an hour in 1982. The middle 50 percent had starting hourly rates between $4.99 and $6.60 and top hourly rates between $6.25 and $8.00.

Most intercity and many local transit busdrivers are members of the Amalgamated Transit Union. Local transit busdrivers in New York and several other large cities belong to the Transport Workers Union of America. Some drivers belong to the United Transportation Union and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America.

Related Occupations

Other workers who drive vehicles on highways and city streets are taxidrivers, truckdrivers, and chauffeurs.

Sources of Additional Information

For further information on employment opportunities, contact local transit systems, intercity buslines, school systems, or the local offices of the State employment service.

General information on local transit busdriving is available from:

American Public Transit Association, 1225 Connecticut Ave. NW., Suite 200, Washington, D.C. 20036.

General information on intercity busdriving is available from:

American Bus Association, 1025 Connecticut Ave. NW., Washington, D.C. 20036.

Construction Machinery Operators (Operating Engineers)

(D.O.T. 570, 850, 851, 853, 859, 869, and 921. The D.O.T. index, which begins on page 364, lists the nine digit codes included under this occupation.)

Nature of the Work

Heavy equipment is used in many different industries. Skilled equipment operators held

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jobs thoughout the economy in 1982. These workers are employed by mining and quarrying firms, logging camps, railroads, and heavy industrial concerns. This statement covers only those equipment operators employed in the construction industry.

Lifting and positioning a quarter-ton pane of glass by crane into an 8-foot by 10-foot window opening 10 stories above the ground require considerable skill. At the crane's controls is a construction machinery operator, also known as an operating engineer. These operators also work the controls of bulldozers, trench excavators, paving machines, and many other types of specialized machinery used at construction sites. Some workers know how to operate many kinds of machines; other workers, only a few. Because the skills and training required vary, construction machinery operators usually are classified by the type of machines they operate. The following paragraphs discuss the duties of operators of three commonly used types of equipment: Tower cranes, bulldozers, and air compressors.

Tower cranes are used to lift and move building materials around a construction site. The crane operator climbs a ladder inside the crane's mast—a tall steel tower—to the control booth that is located beneath the crane's boom—a long steel arm perpendicular to the mast. The operator must accurately judge distances and heights and push or pull a number of buttons, levers, and pedals in proper sequence to pick up and deliver materials. These controls rotate the boom around the mast, and raise and lower a cable with a hook that lifts materials and equipment at the worksite. At times, the operator may not see either the pickup or the delivery point and must follow the hand or flag signals and radio commands of another worker.

Bulldozers gouge out, level, and distribute earth, and remove trees, rocks, and debris from land before building starts. Bulldozer operators generally handle fewer controls than crane operators, and since the "dozer" operator works at ground level, estimating distances is less of a problem.

The operator raises or lowers the "blade" attached to the front of the "dozer" by pushing a button or by pushing or pulling a lever. To clear land, a bulldozer operator lowers the blade to the ground, shifts to forward gear, and presses a pedal for power, causing the blade to scrape and level the ground. The operator will back up and repeat the process until the land is cleared and graded.

Air-compressor operators tend machines that feed compressed air through a heavy-duty hose to run special "air" tools, such as jackhammers. Before starting an air compressor, the operator checks for tight hose connections and may manually pump air through the compressor to check for leaks. The operator also makes sure the compressor has fuel and water. The operator then starts the air compressor and allows it to build sufficient pressure to operate efficiently. While the compressor is running, the operator periodically checks fuel, water, and pressure levels. At the end of the workday, the operator turns the compressor off and "bleeds off" pressure in the tank and hose by opening a release valve. This allows an easy start the next time the compressor is to be used.

Construction machinery operator helpers, sometimes called "oilers," make sure the machines have fuel and oil and are properly lubricated. Helpers also make minor repairs and adjustments. Experienced operators who are working alone also perform these tasks. Major repairs, however, usually are made by heavy-equipment mechanics.

Working Conditions

Construction machinery operators work outdoors, in both hot and cold weather. However, they usually do not work in rain or snow. Operating some machines, particularly bulldozers and some types of scrapers, is physically tiring because the constant movement of the machine shakes or jolts the operator. Also, most machines are noisy. In addition, operators can be injured in accidents involving the equipment. Tower crane operators, for example, may fall as they climb to or from the crane's control booth.

Employment

Approximately 202,000 construction machinery operators held jobs in the construction industry in 1982, about 59,000 fewer than in 1980. This decline reflects the severe dropoff in construction activity during the 1981-82 recession. Most were heavy equipment operators as shown in the following tabulation:

	Percent
Total	100.0
Heavy equipment operators	86.7
Crane, derrick, and hoist operators	10.6
Other construction machinery operators	2.7

Many worked for general building contractors in highway, dam, airport, and other large-scale construction projects. Others worked for utility companies, manufacturers, and other business firms that do their own construction work, as well as State and local highway and public works departments. About one-tenth were self-employed, a smaller proportion than in most building trades.

Construction machinery operators work in every section of the country, both in large cities and in small towns. Some work in remote locations on construction projects, such as highways and dams.

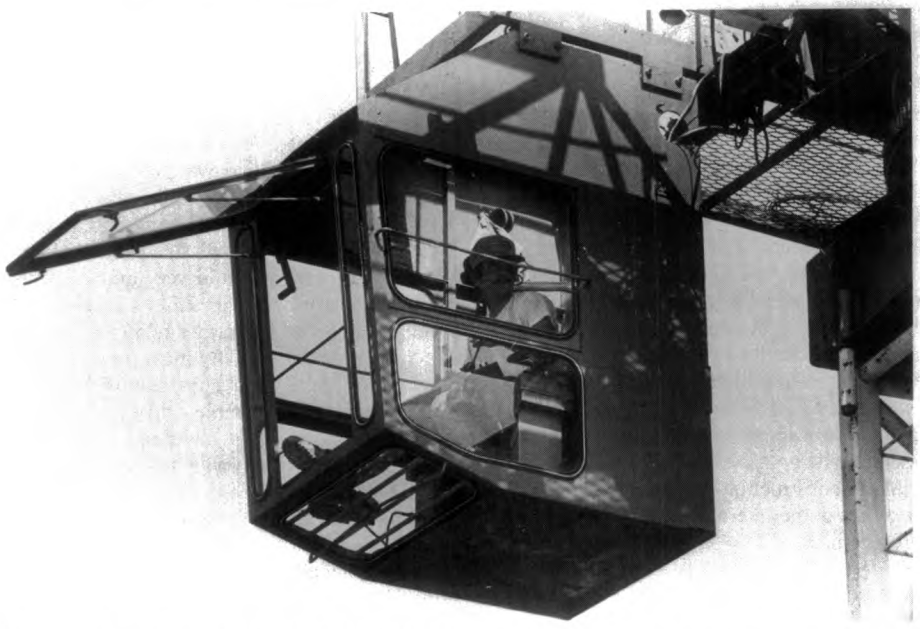
Training, Other Qualifications, and Advancement

Most individuals learn the trade by beginning as truckdrivers or helpers. They may do simple tasks such as cleaning, greasing, and starting machines. Then, under an experienced operator, they learn to repair and operate light equipment. Later, they may learn to operate larger equipment such as bulldozers and cranes. Most training authorities recommend completion of a 3-year formal apprenticeship as the best way to become a construction machinery operator. Since apprentices learn to operate a variety of machines, they have better job opportunities.

The apprenticeship program consists of at least 3 years of on-the-job training and 144 hours a year of related classroom instruction. The programs are administered by union-management committees of the International Union of Operating Engineers and the Associated General Contractors of America.

Apprentices are classified into one of three groups: Universal equipment operators, grade and paving operators, and plant equipment operators. On the job, trainees are taught to operate, maintain, and repair various types of construction equipment and machinery. In the classroom, apprentices receive instruction in engine operation and repair, cable splicing, hydraulics, welding, and safety and first aid.

Employers prefer to hire high school graduates who are at least 18 years old. Courses in driver education and automobile mechanics,



Construction machinery operators often rely on hand signals to place materials at the jobsite.

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and experience in operating tractors and other farm machinery are helpful.

A number of private vocational schools offer instruction in the operation of certain types of construction equipment. Completion of such a program may help a person get a job as a trainee or apprentice. However, persons considering such training should check the reputation of the school among construction employers in the area.

Construction machinery operators need to be alert and have a good sense of balance as well as good eye-hand-foot coordination and physical strength. Advancement is limited. Some operators may become supervisors. Some start their own business, but this generally requires large capital outlays and considerable managerial skill.

Job Outlook

Job opportunities for construction machinery operators should be plentiful over the long run. Employment in this occupation is expected to grow faster than the average for all occupations through the mid-1990's. Part of the projected growth reflects the rebound in employment to pre-recession levels. Population and business growth will lead to the construction of more factories, houses, office buildings, and other structures. More operating engineers also will be needed in maintenance work on roads, bridges, and highways, which is expected to accelerate due to the recently enacted 5-cent-per-gallon tax on gasoline earmarked for this purpose.

Besides the job openings created by increased demand for operating engineers, many openings will arise as experienced workers transfer to other occupations, retire, or die. Jobs should be easiest to find during spring and summer since construction activity generally increases as the weather becomes warmer. Because construction activity is very sensitive to ups and downs in the economy, the number of job openings may fluctuate widely from year to year. When construction activity declines, however, operating engineers who are laid off may be able to find jobs in other industries.

Earnings

Median earnings for construction machinery operators vary considerably, depending upon the type of equipment, but were about $385 a week in 1982. One-half had earnings that ranged between $260 and $500 a week. The top 10 percent earned well over $600 a week. Persons operating light equipment such as pumps and air compressors generally earn less than those operating bulldozers and other types of heavy equipment. Pay scales generally are higher in metropolitan areas. Wage rates for apprentices start at about 70 percent of the full rate paid to experienced workers and increase periodically.

Many construction machinery operators are members of the International Union of Operating Engineers.

Related Occupations

Agriculture, mining, manufacturing, public utilities, and transportation are other industries that use specialized machinery to move earth and materials. Other occupations in which workers operate such equipment include: Bridge-or-gantry-crane operators, coke loaders, continuous mining machine operators, conveyor operators, locomotive-crane operators, longwall mining machine tenders, oil well perforator operators, roof bolters, stevedores, and yarding engineers.

Sources of Additional Information

For further information about apprenticeships or work opportunities in this occupation, contact a local of the International Union of Operating Engineers; a local apprenticeship committee; or the nearest office of the State apprenticeship agency. In addition, the local office of the State employment service may provide information about apprenticeship and other programs that provide training opportunities.

For general information about the work of operating engineers, contact:

Associated Builders and Contractors, 729 15th St. NW., Washington, D.C. 20005.

Associated General Contractors of America, Inc., 1957 E St. NW., Washington, D.C. 20006.

International Union of Operating Engineers, 1125 17th St. NW., Washington, D.C. 20036.

Industrial Truck Operators

(D.O.T. 519.663-014 and .683-014; 911.663-014; 921.583-010 and .683-042, -050, and -070; 929.583-010 and .683-010 and -014)

Nature of the Work

In the past, when a company needed products or raw materials moved from one place to another, workers were required to move the items manually. In most cases, this method was physically demanding and inefficient. Today, the task has been greatly facilitated by the increasing use of power trucks.

A typical industrial truck has a hydraulic lifting mechanism and forks to carry a load on a wooden skid or pallet, or other attachments for greater versatility. For example, a truck may have a clamp lift to move cartons, bales, or paper rolls, multi-forks to handle concrete blocks, or a tow bar to pull warehouse trailers.

Because the trucks are steered by the rear wheels and start and stop very quickly, operators must use care and skill in driving. Although industrial trucks are relatively easy to operate, operators usually must follow special procedures at a plant, warehouse, or construction site. For example, forks must be kept down if the truck is driven without a load. If the load is too high or too wide to see around, the operator must drive the truck in reverse. When loading or removing materials that are stacked on the floor or on a platform, drivers must judge distance accurately and operate the truck smoothly so that no damage occurs to the stock. Operators also must know the lifting capacity of the truck and the kinds of jobs it can do.

Operators may have to keep records of materials moved and do some manual loading and unloading. They also may be responsible for keeping their trucks in good working condition by cleaning and oiling them, checking the water in the batteries, making simple adjustments, and reporting any mechanical problems.

Working Conditions

Industrial truck operators are subject to hazards such as collisions and falling objects. Safety laws to minimize these hazards have led to safer, quieter, and better handling trucks. For example, most rider-type industrial trucks now have overhead guards, and many trucks used outdoors have all-weather cabs. Also, more firms are using battery-powered trucks which are relatively noiseless and pollution-free.

Employment

Industrial truck operators held about 385,000 jobs in 1982, about 30,000 fewer than in 1980. About two-thirds of them worked in manufacturing industries. Large numbers were employed in plants that made automobiles, machinery, fabricated metal products, paper, building materials, and iron and steel. Many industrial truck operators also were employed in warehouses, depots, and freight and marine terminals.

Industrial truck operators are employed in all parts of the country, but most work in large industrial and transportation centers.

Training, Other Qualifications, and Advancement

Few employers have educational or training prerequisites for industrial truck operator jobs. Most persons who enter this occupation have no more than a high school education. About 2 out of 3 entrants transfer from another occupation.

Industrial truck operators train on the job. Most workers can learn to operate an industrial truck in a few days. It takes several weeks, however, to learn the layout of the plant, the operation of a truck in the plant, and the handling of materials in the most efficient way.

Many companies have training programs that include formal instruction, demonstrations, and practice with the industrial truck. Trainees learn how the truck and its lift operate, proper methods of transporting materials, simple maintenance procedures, and safe driving rules. These 1- to 5-day programs stress practice with industrial trucks, which trainees may be required to operate on an obstacle course. Because trucks are becoming more versatile and expensive, firms are expected to emphasize training programs which will increase the skills of operators to avoid damage to trucks and materials and minimize the risk of injury from accidents.

Employers seek applicants who have average manual dexterity, strength, and stamina because operators must get on and off the truck frequently and occasionally load and unload material. Good eyesight, especially good depth perception, is required to pick up, move, and deposit loads with the industrial truck. Large companies generally require applicants to pass

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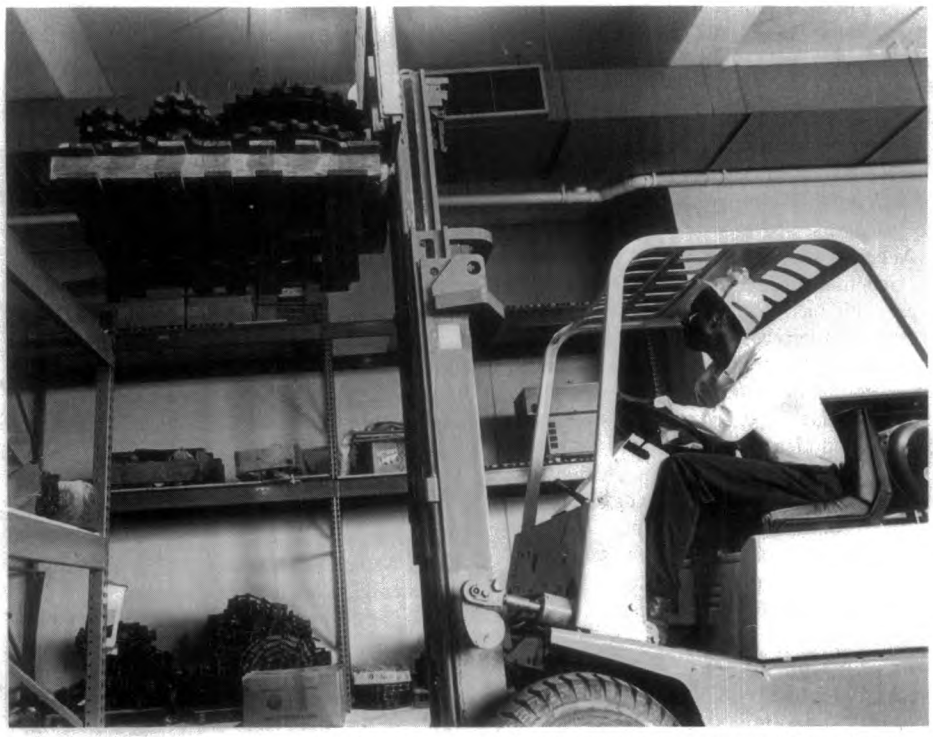

Industrial truck operators must judge distance accurately and operate the truck smoothly so that stock is not damaged.

a physical examination. Some mechanical ability is helpful because operators often perform minor maintenance on industrial trucks.

Opportunities for advancement are limited. A few operators may become supervisors.

Job Outlook

Employment of industrial truck operators is expected to increase more slowly than the average for all occupations through the mid-1990's. Some of this growth will reflect a rebounding of employment, which declined during the 1981-82 recession. Industrial truck operator jobs, two-thirds of which are in manufacturing firms, are quickly affected by swings in the level of economic activity. Although some job openings will result from employment growth, most will arise because of the need to replace industrial truck operators who transfer to other occupations, retire, or die. Replacement needs for this occupation are greater than for most occupations since industrial truck operators are more likely to transfer to other types of jobs.

The growing volume of goods produced and shipped will stimulate demand for additional industrial truck operators. However, increased use of automated material handling systems in large factories and warehouses will slow the rate of employment growth. These computerized systems enable industrial truck operators to move greater quantities of goods more efficiently. In some plants, industrial trucks may even be replaced by a series of conveyor belts and computer-controlled lift mechanisms.

Earnings

Industrial truck operators had median earnings of $300 a week in 1982. The middle 50 percent earned between $230 and $390 a week; the top 10 percent earned more than $470 a week. Forklift operators averaged $9.09 an hour in 1982, while other industrial truck operators earned slightly more. Earnings of operators varied slightly by region and industry.

Related Occupations

Other occupations using power-operated equipment to lift and move materials include conveyor console operators, crane operators, derrick operators, hoist engineers, jammer operators, and operating engineers.

Sources of Additional Information

Information on work opportunities for industrial truck operators may be available from the local office of the State employment service.

Truckdrivers

(D.O.T. 292.353-010, .363-010, .463-010, .483-010, and .667-010; 299.477-010; 900.683-010 through 905.683-010; 906.683; 909.663-010; 919.663-018, -022, -026; and 953.583-010)

Nature of the Work

Nearly all goods are transported by trucks during some of their journey from producers to consumers. Goods may also be shipped between terminals or warehouses in different cities by trains, ships, or planes. But trucks usually make the initial pickup from factories, consolidate cargo at terminals for intercity shipment, and deliver goods from terminals to stores and homes.

Before leaving the terminal or warehouse, truckdrivers check their trucks for fuel and oil. They also inspect the trucks they will drive to make sure the brakes, windshield wipers, and lights are working and see that a fire extinguisher, flares, and other safety equipment are aboard. Drivers adjust mirrors so that both sides of the truck are visible from the driver's seat, and make sure the cargo has been loaded properly so it will not shift during the trip. Drivers report any equipment that does not work, or is missing, or cargo that is not loaded properly to the dispatcher.

Once underway, drivers must be alert to prevent accidents and to drive their trucks efficiently. Because drivers of large tractor-trailers sit higher than cars, pickups, and vans, they can see far down the road. They seek traffic lanes that allow them to move at a steady speed, and, when going downhill, they may increase speed slightly to gain momentum for a hill ahead.

Long-distance runs vary widely. On short "turnarounds," truckdrivers deliver a load to a nearby city, pick up another loaded trailer, and drive it back to their home base the same day. Other runs take an entire day, and drivers remain away from home overnight. On longer runs, drivers may haul loads from city to city for a week before returning home. Some companies use two drivers on very long runs. One drives while the other sleeps in a berth behind the cab. "Sleeper" runs may last for days, or even weeks.

Long-distance drivers who have regular runs transport freight to the same city on a regular basis. Because shippers request varying amounts of service to different cities every day, many drivers have unscheduled runs. Dispatchers tell these drivers when to report for work and where to haul the freight.

After long-distance truckdrivers reach their destination, they complete reports about the trip and the condition of the truck, as required by the U.S. Department of Transportation. They must give a detailed report of any accident.

Long-distance truckdrivers spend most of their working time behind the wheel. Drivers hauling some specialty cargo, though, often load or unload their trucks, since they may be the only one at the destination familiar with this procedure. Auto transport drivers, for example, drive and position the cars on the racks and remove them at the final destination. When picking up or delivering furniture, drivers of long-distance moving vans hire local workers to help them load or unload.

When local truckdrivers receive assignments from the dispatcher to make deliveries, pickups, or both, they also get delivery forms. Before the drivers arrive for work, material handlers generally have loaded the trucks and arranged the items in order of delivery to minimize handling of the merchandise.

At the customer's place of business, local truckdrivers generally load or unload the merchandise. If there are heavy loads or many deliveries to make during the day, drivers may have helpers. Customers must sign receipts for goods and drivers may receive money for material delivered. At the end of the day, they turn in receipts, money, and records of deliveries made

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and report mechanical problems with their trucks.

The work of local truckdrivers varies, depending on the product they transport. Produce truckers usually pick up a loaded truck in the early morning and spend the rest of the day delivering produce to many different grocery stores. Lumber truckdrivers, on the other hand, make several trips from the lumber yard to one or more construction sites. Gasoline tank truckdrivers attach the hoses and operate the pumps on their trucks to transfer the gasoline to gas stations' storage tanks.

Some local truckdrivers have sales and customer relations responsibilities. These drivers—called driver-sales workers or route drivers—are primarily responsible for delivering their firm's products, but they also represent the company. Their reaction to customer complaints and requests for special service can make the difference between a larger order and losing a customer. Route drivers also may use their selling ability to increase sales and to gain additional customers.

The duties of driver-sales workers vary according to the industry in which they are employed, the policies of their particular company, and how strongly their sales responsibilities are emphasized. Most have wholesale routes—that is, they deliver to businesses and stores rather than homes. A few deliver various foods to homes, or pick up and deliver drycleaning, but retail routes are now rare.

Wholesale bakery driver-sales workers, for example, deliver and arrange bread, cakes, rolls, and other baked goods on display racks of grocery stores. Paying close attention to the items that are selling well or sitting on the shelves, they estimate the amount and variety of baked goods that will be sold. They may recommend changes in a store's order or may encourage the manager to stock new bakery products. From time to time, they try to get the business of new stores along their route.

Driver-sales workers employed by laundries that rent linens, towels, work clothes, and other items visit businesses regularly to replace soiled laundry.

Vending machine driver-sales workers, who service machines in factories, schools, and other buildings, check items remaining in the machines, replace stock, and remove money deposited in the cash boxes. They also examine each vending machine to see that merchandise and change are dispensed properly, make minor repairs, and clean machines.

Afte completing their route, driver-sales workers order items for the next day which they think customers are likely to buy, based primarily on what products have been selling well, the weather, time of year, and any discussion they may have had with customers.

Working Conditions

Truckdriving has become less physically demanding because most trucks now have more comfortable seats, better ventilation, and improved cab designs. However, making many deliveries during a day and driving in heavy traffic can be nerve racking. Local truckdrivers, unlike long-distance drivers, usually can return home in the evening.

Local truckdrivers frequently work 48 hours or more a week. Many who handle food for chain grocery stores, produce markets, or bakeries drive at night or early in the morning. Although most drivers have a regular route, some have different routes each day. Many local truckdrivers—particularly driver-sales workers—load and unload their own trucks, requiring considerable lifting, carrying, and walking.

The U.S. Department of Transportation governs work hours and other matters of trucking companies engaged in interstate commerce. For example, a driver cannot be on duty for more than 60 hours in any 7-day period and cannot drive more than 10 hours without being off duty at least 8 hours. Many drivers, particularly on long runs, work close to the maximum hours permitted. Drivers on long runs may face boredom and fatigue. Although many drivers work during the day, night travel is common and frequently preferred because roads are less crowded and trips take less time.

Employment

Truckdrivers held about 2.4 million jobs in 1982. Jobs are concentrated in and around large cities. Some drivers are employed in almost all communities, however.

Trucking companies employed about one-fourth of all truckdrivers. One-third worked for companies engaged in wholesale or retail trade, such as auto parts stores, oil companies, lumber yards, or distributors of food and grocery products. The rest were scattered throughout the economy, including government agencies. Less than one-tenth of all truckdrivers are self-employed; of these, a significant number are owner-operators, who either operate independently, serving a variety of businesses, or lease their services and their trucks to a trucking company.

Training, Other Qualifications, and Advancement

Qualifications for truckdrivers vary considerably, depending upon the type of truck and the nature of the employer's business. In most States, applicants must have a chauffeur's license, which is a commercial driving permit. Information on how to get this license can be obtained from State motor vehicle departments. Applicants may have to pass a general physical examination, a written examination on driving regulations, and a driving test. They should have good hearing and at least 20/40 vision with or without glasses, be able to lift heavy objects, and be in good health.

The U.S. Department of Transportation establishes minimum qualifications for truckdrivers who are engaged in interstate commerce. A driver must be at least 21 years old and pass a physical examination, which the employer usually pays for. Good hearing, 20/40 vision with or without glasses, normal use of arms and legs (unless a waiver is obtained), and normal blood pressure are the main physical requirements. In addition, drivers must take a written examination on the Motor Carrier Safety Regulations of the U.S. Department of Transportation.

Many trucking operations have higher standards than those described. Many firms require that new drivers be at least 25 years old. Others specify height and weight limitations. Some companies employ only applicants who have driven trucks for several years.

Since truckdrivers work with little supervision, employers seek individuals who are responsible and self-motivated.

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Driver-training courses are a desirable method of preparing for truckdriving jobs. Most training authorities and employers recommend high school driver-training courses. In addition, a high school course in automotive mechanics helps drivers make minor roadside repairs.

A small number of private and public technical-vocational schools offer truckdriving courses. Students learn to inspect the trucks and freight, to drive large vehicles in crowded areas and in highway traffic, and to comply with Federal, State, and local regulations. Completion of a course, however, does not assure a job. Graduates of these schools who do get truckdriving jobs often start as local drivers. Persons interested in attending one of these schools should check with local trucking companies to make sure the school's training is acceptable to them.

Employers prefer applicants with a good driving record and some previous experience driving a truck. Very few people enter truckdriving directly from school. Consideration is given to driving experience in the Armed Forces. A person also may drive part of the day as a truckdriver's helper. When driving vacancies occur, senior helpers usually are promoted.

A more common method of entering truckdriving is to start out as a dockworker, loading and unloading freight. Dockworkers get a general idea of the trucking operation, and they may have an opportunity to move trucks around the yard. When a need for a truckdriver develops, a capable dockworker may be promoted. New drivers often start on panel or other small "straight" trucks. As they gain experience and show good driving skills, they may advance to larger and heavier trucks, and finally to tractor-trailers. Local drivers with tractor-trailer experience are good candidates for long-distance jobs. Graduates of truckdriving schools who cannot get driving jobs sometimes become dockworkers. Their school experience gives them an advantage over other dockworkers when driving vacancies occur.

Since drivers often deal directly with the company's customers, they must get along well with people. For jobs as driver-sales workers, an ability to speak well and a neat appearance are particularly important, as are self-confidence, initiative, and tact. For all truckdriver jobs, employers also look for responsible, self-motivated individuals, since drivers work with little supervision.

Training given to new drivers usually is informal and may consist only of a few hours of instruction from an experienced driver, sometimes on the new employee's own time. New drivers also may ride with and observe experienced drivers before being assigned their own runs. Additional training may be given if they are to drive a special type of truck. Some companies give 1 to 2 days of classroom instruction which covers general duties, the operation and loading of a truck, company policies, and the preparation of delivery forms and company records. Driver-sales workers also receive training on the various types of products they carry so they will be more effective sales workers and better able to handle customer requests.

Although most new truckdrivers are assigned immediately to regular driving jobs, some start as extra drivers, who substitute for regular drivers who are ill or on vacation. They receive a regular assignment when an opening occurs.

Some long-distance truckers purchase a truck and go into business for themselves. Although many of these owner-operators are successful, a large number fail to cover expenses and eventually lose their trucks. Owner-operators should have good business sense as well as truckdriving experience. Courses in accounting, business, and business arithmetic are helpful.

Local truckdrivers may advance to dispatcher, to manager, or to traffic work—for example, planning delivery schedules. However, relatively few of these jobs are available. For the most part, a local truckdriver may advance to driving heavy or special types of trucks or transfer to long-distance truckdriving. Working for companies that also employ long-distance drivers is the best way to advance to these positions. Most drivers can only advance to driving runs that provide increased earnings or preferred schedules and working conditions.

Job Outlook

Employment of truckdrivers is expected to increase about as fast as the average for all occupations through the mid-1990's. Because the amount of freight carried by trucks is expected to increase, the demand for drivers should increase, but more slowly than the growth in freight because larger trucks and improved roads should increase the amount of freight each driver can haul. The number of truckdrivers with sales responsibilities is expected to decline as companies shift sales, ordering, and customer service to sales and office staffs, and replace driver-sales workers with delivery drivers.

This occupation has among the largest number of job openings each year. Although thousands of openings will be created by growth in demand for drivers, the majority will occur as experienced drivers transfer to other fields of work, retire, or leave the labor force for other reasons. Since driver earnings are high and no formal training is required, applicants can expect to face strong competition for available jobs.

Job opportunities may vary from year to year because the amount of freight moved by trucks fluctuates with the economy. Many new truckdrivers are hired when the economy and the volume of freight are expanding, but few when these decline. During economic slowdowns, some truckdrivers are laid off and others have decreased earnings because of reduced hours. Those in industries such as wholesale food distribution, which is usually not affected much by recessions, are less likely to be laid off.

Earnings

As a rule, local truckdrivers are paid by the hour and receive extra pay for working overtime, usually after 40 hours. The earnings of long-distance drivers vary, depending on mileage driven, number of hours worked, and type of truck. Most driver-sales workers receive a commission based on their sales, in addition to an hourly wage. However, straight-time pay rates are fairly uniform because truckdriving is highly unionized, and union contracts generally cover all drivers within a multistate region.

In 1982, truckdrivers had average straight-time hourly earnings of $9.84. Depending on the size truck, average earnings were as follows:

Tractor-trailer	$10.80
Medium truck	9.52
Heavy straight truck	9.44
Light truck or van	6.87

Most long-distance truckdrivers operate tractor-trailers. Drivers employed by trucking companies had the highest earnings, averaging nearly $12 an hour in 1982. Truckdrivers in the North Central States had the highest earnings while those in the South had the lowest.

Many truckdrivers are members of the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America (Ind.). Some truckdrivers employed by companies outside the trucking industry are members of unions that represent the plant workers of the companies for which they work.

Related Occupations

Other driving occupations include ambulance driver, busdriver, chauffeur, hostler, and taxi driver.

Sources of Additional Information

Information on truckdriver training schools and on career opportunities in the trucking industry may be obtained from:

American Trucking Associations, Inc., 1616 P St. NW., Washington, D.C. 20036.

For details on truckdriver employment opportunities, contact local trucking companies or the local office of the State employment service.

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OTHER TRANSPORTATION AND MATERIAL MOVING OCCUPATIONS

Title	Definition	Employment 1982	Projected growth 1982–95
Ambulance drivers and attendants	Drive ambulances or assist ambulance drivers in transporting sick, injured or convalescent persons. Assist in lifting patients and rendering first aid. May be required to have Red Cross first-aid training certificate.	28,000	About as fast as average
Brakers, train	Work involves any of the following activities: Inspects equipment, such as couplings, airhoses, journal boxes, and handbrakes, to insure that they function properly; throws switches, couples, or attaches cable to cars being hauled by locomotive or hoisted by cable or chain to load and unload cars or make and break up trains. May assist passengers in boarding and leaving train.	60,000	Expected to decline
Chauffeurs	Drive automobiles, limousines, and mortuary vehicles. May have additional duties regarding cleaning and maintenance of vehicles.	48,000	Faster than average
Conductors, train	Supervise and coordinate activities of train crews performing activities such as keeping crews on timetable schedules, following train orders, assisting passengers to board trains and collecting tickets or passes from passengers.	27,000	Expected to decline
Flight engineers	Make preflight, inflight, and post flight inspections, adjustments, and minor repairs to insure safe and efficient operation of aircraft. Inspect aircraft prior to takeoff for defects, such as fuel or oil leaks and malfunctions in electrical, hydraulic, or pressurization systems according to preflight checklist. Must be licensed by the Federal Aviation Administration. May be required to be licensed as a commercial airplane pilot.	5,600	Expected to decline
Locomotive engineers	Drive electric, diesel-electric, steam, or gas-turbine-electric locomotives; interpreting train orders, block or semaphore signals, and railroad rules and regulations to transport passengers or freight.	16,000	Little change is expected
Oil pumpers	Operate steam, gas, gasoline, electric, or diesel pumps and auxiliary equipment to restore and control flow of oil from wells.	18,000	Little change is expected
Taxi drivers	Operate taxicabs to transport passengers for fee. May drive limousine or custom-built sedan to pick up and discharge airport passengers arriving or leaving on scheduled flights and be designated Chauffeur, Airport limousine.	64,000	Expected to decline

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Helpers, Handlers, Equipment Cleaners, and Laborers

Helpers, handlers, equipment cleaners, and laborers assist skilled workers and perform the routine tasks required to complete a project. Millions of persons work in these jobs in nearly every industry and geographic area of the Nation.

Helpers assist machine operators and tenders who work with metal, wood, plastic, textiles, and other materials. Some helpers aid workers who fabricate, assemble, and hand finish manufactured goods. Others help workers who inspect, test, examine, and sample raw materials and finished products. Mechanic and repairer helpers aid in adjusting, maintaining, and repairing tools, equipment, and machines. In the construction trades, helpers and laborers work with bricklayers, carpenters, electricians, painters, surveyors, and others to build and maintain buildings, roads, bridges, and other projects. Still other helpers assist in drilling oil wells, blasting, and cutting materials to be mined.

Most handlers, equipment cleaners, and laborers manually lift and carry materials in production activities. Garbage collectors gather refuse for disposal. Stevedores load and unload ships' cargoes. Stock handlers sort and place tools, equipment, and other materials. Baggers package groceries. Machine feeders deposit or remove materials from machines or equipment. Fuel pump attendants and lubricators fill gas tanks, check engine oil and air pressure in tires, clean windshields, and do other routine services on cars and trucks in garages and gasoline service stations. Parking lot attendants park cars at lots and garages. Many industries need cleaners to help maintain the appearance and function of vehicles and equipment. Other workers pack materials for shipment and storage.

Because their jobs require little skill, helpers, handlers, equipment cleaners, and laborers have minimal education requirements. They usually learn their duties on the job or in short training sessions given by the employer.

These workers must be in good physical health because most jobs require frequent bending and heavy lifting. Jobs may require outdoor work, sometimes in uncomfortable weather conditions. Occupational hazards include cuts, burns, and sore or strained muscles.

Jobs as helpers, handlers, equipment cleaners, and laborers are expected to be plentiful due to the very high turnover rate in these occupations. However, some of these workers may be laid off during recessions. This is particularly common among construction laborers and others working in industries that are sensitive to cyclical swings in the economy. Also, some workers may lose their jobs as routine tasks are mechanized.

Many helpers, handlers, equipment cleaners, and laborers earn relatively low wages. Supervisors and workers who belong to unions, however, can expect to earn higher wages. Many workers, such as construction laborers, do not earn any wages when weather or economic conditions prevent them from working.

Detailed information on the nature of the work, employment, training requirements, job outlook, earnings, and working conditions for construction laborers and helpers—the largest of the helper, handler, equipment cleaner, and laborer occupations—is presented in the following statement.

Construction Laborers and Helpers

(D.O.T. 637, 840, 850, 853, 860, 861, 862, 864, 869, 899, and 930. The D.O.T. index, which begins on page 364 lists the nine digit codes included under this occupation.)

Nature of the Work

Construction laborers and helpers worked in many industries in 1982. They were employed by manufacturing firms, railroads, public utilities, coal mines, oil and gas extraction firms, and local governments. This statement covers only those construction laborers and helpers working in construction related jobs.

Construction laborers and helpers provide much of the routine physical labor on all types of construction and demolition projects. They erect and dismantle scaffolding, set braces to support the sides of excavations, and clean up rubble and debris. Laborers also help unload and deliver materials, machinery, and equipment to carpenters, masons, and other construction workers. Because they perform a wide variety of jobs, laborers are employed during all phases of a construction project.

Some construction laborers have job titles that indicate the work they do. Bricklayers' tenders and plasterers' tenders, both commonly known as hod carriers, help bricklayers and plasterers by mixing and supplying materials, setting up and moving portable scaffolding, and providing many other services. Hod carriers must be familiar with the work of bricklayers and plasterers and know the materials and tools they use. Construction laborers also pour and place concrete preliminary to the finishing work done by cement masons.

Another group of laborers, pipelayers, lay sewer and other large, nonmetal pipe and seal connections with concrete and other materials.

Recent years have seen much mechanization of laborers' tasks. Thus, laborers now may operate motorized lifts and ditchdiggers of the

A big part of the laborer's job is keeping craft workers supplied with materials.

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"walk-behind" variety, various kinds of small mechanical hoists, and laser beam equipment to align and grade ditches and tunnels.

Although some construction laborers' jobs require only a few basic skills, many jobs require training and experience, as well as a broad knowledge of construction methods, materials, and operations. Rock blasting, rock drilling, and tunnel construction are examples of work in which "know-how" is important. Laborers who work with explosives must know the effects of different explosive charges under varying rock conditions to prevent injury and property damage. Laborers do almost all the work in the boring and mining of a tunnel, including operations that workers in other trades would handle for a job above ground.

Working Conditions

Construction work is physically strenuous, since it requires frequent bending, stooping, climbing, and heavy lifting. Much of the work is performed outdoors. Construction laborers, like almost all other workers in construction occupations, are subject to falls from scaffolds; cuts, burns, and abrasions from various tools and equipment; and sore or strained muscles from heavy lifting.

Employment

Construction laborers and helpers held about 576,000 jobs in 1982, about 367,000 fewer than in 1980. This large decline reflects the severe dropoff in construction activity during the 1981-82 recession. Most worked as construction trades helpers as shown in the following tabulation:

	Percent
Total	100.0
Helpers, trades (construction industry)	55.9
Highway maintenance workers	28.7
Pipelayers	7.4
Asphalt rakers	2.6
Fence erectors	2.4
Air hammer operators	1.8
All other construction laborers	1.3

Construction contractors, State and city public works and highway departments, and public utility companies were their major employers.

Training, Other Qualifications, and Advancement

Little formal training is needed for a job as a construction laborer. Generally, applicants must be at least 18 years old, in good physical condition, and be willing to work hard.

Many new employees transfer from lower paying occupations such as farm laborer or janitor. Many other persons take jobs as construction laborers because no previous experience is required or the work schedule does not interfere with school, another job, or other activities.

Beginners' jobs are usually of the simplest type, such as unloading trucks and digging ditches. As workers gain experience, job assignments become more complex. In order to prepare laborers for more difficult tasks, contractors and unions have established 4- to 8-week entry level training programs in many States to teach basic construction concepts, safety practices, and machinery operation. In addition, some programs offer training to help experienced laborers keep abreast of technological advances.

Job Outlook

Employment of construction laborers is expected to grow about as fast as the average for all occupations through the mid-1990's. Some growth will occur as employment rebounds from the recession, but employment is not expected to reach prerecession levels. Job openings, however, should be plentiful because the occupation is large and turnover is high. Many people take laborer jobs in order to earn money for a specific purpose—for example, a college education—and quit after a short time. Others decide they don't like the work and leave the occupation. Still others stay only long enough to acquire the minimum skills that enable them to move into craft jobs such as carpenter, bricklayer, or cement mason.

Growth in population and economic activity will spur construction in the years ahead and laborers will be needed to move materials, place concrete, and help craft workers on construction projects, particularly large projects such as bridges, dams, high-rise buildings, and powerplants. Demand will not keep pace with the level of construction, however, because technological advances reduce the need for human labor. For example, construction laborers traditionally have moved materials to keep bricklayers and other craft workers supplied. But a fork-lift vehicle now enables a single hod carrier to supply many bricklayers for a full day.

Employment of construction laborers is highly sensitive to cyclical swings in the economy, particularly to the level of construction activity. Consequently, layoffs are common among these workers when the level falls.

Earnings

Median weekly earnings for construction laborers working full time were about $255 in 1982. One-half earned between $190 and 345 weekly; the highest 10 percent earned more than $465 a week.

Union wage rates for construction helpers and laborers in large metropolitan areas averaged $11.50 an hour in mid-1982, compared with $7.67 an hour for all production and nonsupervisory workers in private industry, except farming. Wage rates vary considerably by area of the country.

Annual earnings for construction laborers generally are lower than hourly rates would indicate because poor weather and fluctuations in construction activity may adversely affect the number of hours they can work a year.

Many construction laborers are members of the Laborers' International Union of North America.

Related Occupations

In assisting skilled craft workers, construction laborers combine strength, willingness to learn, and the ability to follow directions. Other occupations which require similar attributes are blacksmith helpers, dock hands, material handlers, quarry workers, and sand blasters.

Sources of Additional Information

For information about work opportunities, contact local building or construction contractors, local construction associations, a local of the Laborers' International Union of North America, or the local office of the State employment service.

For general information about the work of construction laborers, contact:

Laborers' International Union of North America, 905 16th St. NW., Washington, D.C. 20006.

Laborers'-Associated General Contractors' Education and Training Fund, 1730 Rhode Island Ave. NW., Suite 909, Washington, D.C. 20036.

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OTHER HANDLERS, EQUIPMENT CLEANERS, HELPERS, AND LABORERS

Title	Definition	Employment 1982	Projected growth 1982–95
Cleaners, vehicle	Clean interiors and exteriors of transportation vehicles, such as automobiles, buses, and planes. Wash vehicles, sweep and clean interiors of the vehicles; may polish automobile bodies.	100,000	Faster than average
Garbage collectors	Collect refuse on designated routes within municipalities and dump refuse from containers onto trucks.	110,000	More slowly than average
Parking attendants	Park automobiles for customers in parking lots or storage garages.	37,000	Little change is expected
Rotary drill operator helpers	Assist rotary drillers in operating machinery to drill oil or gas wells, using hand tools and power tongs and wrenches.	33,000	Expected to decline
Sailors and deckhands	Stand deck department watch and perform a variety of tasks to preserve painted surface of ship and to maintain lines, running gear, and cargo-handling gear in safe operating condition. May handle lines to moor vessels, wash decks, or load and unload materials.	32,000	More slowly than average
Stock handlers	Control the flow of supplies in and out of stock rooms. Unpack, store, and issue goods, and keep track of items in storage.	962,000	About as fast as average
Surveyor helpers	Assist surveyors by performing a variety of duties, such as measuring distances between survey points using chain or tape; holding leveling or stadia rod at designated points to assist in determining elevations; laying out construction stakes; positioning and adjusting light, mirror, or electronic signal equipment used in surveying by triangulation.	40,000	Much faster than average

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Dictionary of Occupational Titles (D.O.T.) Index

Dictionary of Occupational Titles (D.O.T.) Fourth Edition numbers referenced in the occupational statements are listed in column 1. Numbers in column 2 represent the classification structure of the 1980 *Standard Occupational Classification Manual (S.O.C.)*—upon which the *Handbook's* clustering arrangement is based.

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[2]71, 7332-3, 7339, 7532-3, 7714, 7717, 7720.

[3]4753, 6863, 725, 7671, 7678, 7720, 7753, 7757, 7759, 782.

[4]For machine tool operators and assemblers, D.O.T. codes are not listed in the occupational statement because of the large number involved. For a list of these codes, contact: Chief, Division of Occupational Outlook, Bureau of Labor Statistics, Washington, D.C. 20212

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