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# *Occupational Outlook Handbook*

Employment Information  
on major occupations  
for use in guidance

**Bulletin No. 940**

United States Department of Labor • Bureau of Labor Statistics  
in cooperation with the Veterans Administration



# Occupational Outlook Handbook

## Employment Information on Major Occupations for Use in Guidance

*prepared in cooperation with*

**VETERANS ADMINISTRATION**

**OFFICE OF THE ASSISTANT ADMINISTRATOR**

**FOR VOCATIONAL REHABILITATION AND EDUCATION**

**Bulletin No. 940**

**UNITED STATES DEPARTMENT OF LABOR**

*Maurice J. Tobin, Secretary*

**BUREAU OF LABOR STATISTICS**

*Ewan Clague, Commissioner*



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## Letter of Transmittal

UNITED STATES DEPARTMENT OF LABOR,  
BUREAU OF LABOR STATISTICS,  
*Washington, D. C., September 1, 1948.*

THE SECRETARY OF LABOR:

I have the honor to transmit herewith the Occupational Outlook Handbook, prepared in the Bureau's Occupational Outlook Branch, with contributions by the Bureau of Agricultural Economics, United States Department of Agriculture, the Women's Bureau of the United States Department of Labor, and the Office of Education, Federal Security Agency.

Young people, veterans, or older workers who are choosing a career or course of training need current information on employment trends and outlook in the various occupations. Recognizing this need, the Congress, on a recommendation of the Advisory Committee on Education, provided for the establishment of an Occupational Outlook Service in the Bureau of Labor Statistics in 1940. This handbook presents, in brief form, some of the major results of the Bureau's first 7 years of research in occupational trends.

The reports contained in this handbook were originally prepared at the request and with the financial support of the Veterans Administration, which, under the provisions of the Servicemen's Readjustment Act of 1944, was authorized to make available information respecting the need for general education and for trained personnel in the various trades, crafts, and professions. They were issued in August 1946 as VA Manual M7-1, "Occupational Outlook Information." With the continuing financial support of the Veterans Administration these reports have been brought up to date and expanded in the present volume, which accordingly supersedes VA Manual M7-1.

The handbook is being published in its present form and is being made available through public sale in answer to many requests, including one from the National Vocational Guidance Association, expressed in a resolution adopted at its convention in March 1947. It is designed for use in schools, colleges, Veterans Administration regional offices and guidance centers, employment service offices, community organizations, and other agencies engaged in the vocational guidance of young people, veterans, and workers.

The Bureau wishes to acknowledge with gratitude the cooperation of hundreds of industrial firms, unions, trade associations, and professional societies, whose officials gave freely of their time in discussing employment trends in their respective fields in supplying information, and in reviewing and commenting upon drafts of the reports.

In the selection of occupations to be studied and the preparation of the reports to meet the needs of veterans, the Bureau wishes to acknowledge especially the guidance of the office of the Assistant Administrator for Vocational Rehabilitation and Education, Veterans Administration, and Donald H. Davenport, consultant to the Administrator of Veterans' Affairs.

EWAN CLAGUE, *Commissioner.*

HON. MAURICE J. TOBIN,  
*Secretary of Labor.*

## Foreword

The material contained in these excellent reports is of the greatest value to counselors, teachers of classes in occupations, and many other workers interested in factual data on our occupational life. The reports have been scientifically compiled and are well organized for counseling use.

No agency except the Bureau of Labor Statistics could so well appraise the long-term trends, the cyclical fluctuations and their effects, and the influence of regional conditions and resources.

The information presented will be of inestimable value to individuals contemplating the investment of time and money in vocational training courses and to training institutions planning or revising their curricular offerings.

The publication of these reports marks a high level of achievement in a new and significant area.

WARREN K. LAYTON,  
*President, National Vocational  
Guidance Association.*

## Contributors

This handbook was prepared in the Bureau's Occupational Outlook Branch under the direction of Seymour L. Wolfbein, Branch Chief. Harold Goldstein prepared the introductory sections and was responsible for the general planning and organization of the book. Helen Wood and Richard H. Lewis supervised the research on employment opportunities and the preparation of the occupational outlook reports. The following members of the staff contributed sections: Calman R. Winegarden, Arthur W. Frazer, Cora E. Taylor, Judith Grunfel, Samuel Vernoff, Harold Wool, Alexander C. Findlay, Robert W. Cain, Raymond D. Larson, Sol Swerdloff, Frank Dischel, John S. McCauley, Chester F. Schimmel, Herbert L. Gottlieb, Evelyn W. Farber, Josephine C. Solomon, Ruth B. Gordon, Cora S. Crone-meyer, Gloria H. Count, Bella D. Uranson, Claire L. Labbie, Hilda L. Pearlman, Vincent H. Arkell, Sylvia K. Lawrence, and Doris M. Graham.

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The Occupational Analysis Branch, United States Employment Service, gave advice and assistance in the preparation of the handbook, particularly on matters of occupational classification and descriptions of occupations.

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# Occupational Outlook Handbook

## Putting the Handbook to Work

The counselor or teacher who examines this handbook for the first time may make enthusiastic plans for its use in his classroom or at his desk. Yet in employing the handbook primarily either as a text or as an immediate source of reference, the teacher, the counselor, or the counselor trainer may overlook its real value.

Perhaps the two points about the occupational field which most readily elude the counselor or teacher concern the extremely fluid character of occupational factors and the relative nature of all occupational data.

Many books detailing occupational facts are obsolete nearly from the time they appear in print. Individual occupations may be destroyed in the wake of a new invention. Whole areas may no longer offer certain types of opportunity because of such unpredictable matters as a change in freight rates or the invention and promotion of a substitute product. The ebb and flow of prosperity in 6 months can throw scores of thousands of persons engaged in a luxury trade out of work or can, on the other hand, create a demand for a skill heretofore perhaps not even known.

The relative nature of occupational information implies that no bald statement should be made about the characteristics of a particular job, or the opportunity presented by a group of occupations. Such statements are valid only when they have been related to geography, locale, and above all to the traits of the individual prospective worker. Mistakes arising from ignoring this principle have plagued the counselor and the counselee ever since counseling has been a profession.

For these reasons the handbook can be of unique assistance to the person who is teaching occupations or who is counseling on vocational problems. The fact that it describes 288 specific occupations under diverse headings reveals the special nature of its

occupational treatment. The details of each occupation must be filled in by the teacher or counselor from other sources of information about employment conditions, the local scene, and the individual who is studying his personal problems. The 288 occupations are keys to nearly 30,000 descriptive terms which fill the "Dictionary of Occupational Titles" and which are representative of the great bulk of occupations in this country. The two factors of suggestiveness and comprehensiveness make the book valuable in helping to fill a known void.

The main value of this handbook for the teacher or counselor lies in its orientation. For such users the most important parts of this publication in many respects are the preliminary chapters and the introduction to each of its main and subordinate report sections. The brief statements on trends and interpretations contain the material most lacking in the background of many potential users of the book, especially those who have not had the benefit of a comprehensive course in occupational information. From these statements emerges a concept of the fluid nature of occupational data. These trends are dependent on many factors in American life that require hard study if they are to be understood. At the same time the reader realizes that certain trends may be seen, and that a reasonable amount of confidence in the prediction as to the future of specific occupational fields may be justified. Because these trends are stated in guarded terms the reader is constantly referred to a study of local and specific conditions as a corrective for jumping at conclusions.

For the counselee the value of the handbook lies in its contribution to his long-term planning. A common problem for the pupil in high school or the student in college is that of looking ahead from 3 to 10 years in order to map out a career in which he can take full advantage of his personal traits

on the one hand and of occupational opportunities on the other. For this purpose an occupational brief or description has relatively little value. It is perspective which counts. If the individual, therefore, is trying to solve a vocational problem which includes such things as preliminary training, apprenticeship, college work, professional training, internship, an entry occupation, and perhaps migration, he must be concerned with trends. He must have an outlook which includes a reasonable prediction as to what the conditions of employment in a field of work may be 5 or 10 years ahead.

Whether the handbook may be used directly for study by the counselee is a question which depends a good deal upon his maturity and ability to understand abstract ideas. For the counselor who works with the individual, however, the handbook provides the basic material from which he can devise simpler means for presenting the facts. The comprehensive series of charts may help. Some restatement in terms of the interests of young people in a specific school or the industries found in their locality may be devised by the counselor on the basis of the sound principles of the handbook. At least it may be said that for career planning the ideas in the handbook are indispensable. Such ideas must enter into the counseling interview or into the study which the counselee may pursue at the suggestion of the counselor who is helping him.

The high-school class in occupations is another potential user of the handbook. Here again the teacher is limited by the range of ability in the class and the difficulty which abstract ideas present to perhaps the majority of high-school pupils. It is suggested that the principles contained in the study of trends may be taught best through the study of some specific problem.

The town itself may be affected by a crucial trend which is upsetting its entire economy. It may be a northern city dependent on a textile industry which is steadily moving south. The high school may be in a region where some agricultural product such as cotton is the main source of revenue, and pupils may then study what is happening already to cotton-raising in specific communities because of new machinery, a change in markets, and the buying habits of the public. The prosperity of another city may be tied up with mining or some

other industry threatened by depletion or new processes. A new plant which has the capacity of employing a considerable portion of available labor in the community may come upon the scene. It may also attract many workers from elsewhere, with the inevitable effects of increasing the population and the opportunities of every nature which a larger population creates. There may be excellent examples locally of professional specialization in engineering, for instance, or in medicine. There can scarcely be any community in which the rapid increase in the use of deep-freeze cabinets and television sets, for example, has not created new employment opportunities for men skilled in installation and maintenance.

All of the projects suggested above exemplify one phase or another of the problems treated in the handbook. To the person teaching the class the handbook reveals the important aspects of outlook information which must be illustrated in the occupations class if the pupils are to view their problems with sufficient perspective to get away from the immediate job and the oversimplified facts of a job description.

The handbook, of course, also supplies specific resources. Among these are graphic charts which may be reproduced in wall size or which may be used as models for charts about local facts and trends secured by members of the class or from local sources. The 288 reports on separate occupations may serve the double purpose of providing a reference illustrative of almost every field of work, and also a model for some similar attempt to study the occupational outlook in a phase of local commerce or industry.

For the counselor trainer the handbook provides an indispensable tool. The new stress in counselor training is on competencies. Competency in the occupational phase of the counselor's work includes his ability to move from the general to the particular or vice versa. He must be concerned with trends which are Nation-wide in their significance and their relationship to any immediate problem of a counselee. He must on the other hand be able to help interpret the counselee's ambitions in terms of the long view. Brief treatments of such matters as the ratio of openings in a field of occupations, the effect of population gain or loss on jobs available to young people, the ascertainable flow



of migration suggest projects to the counselor trainer for individual study. In the field of occupational information it is important to encourage and develop the concepts that occupational data are always fluid and always relative in nature, concepts which have already been mentioned as among the important but too often missing knowledges in the counselor's equipment. On page 5 the handbook disclaims any treatment of a list of many topics commonly included in the general textbook on occupations. This fact alone calls attention to its concentration in the field of outlook and enables the counselor trainer to give more definition to his study of a neglected area.

Occupational data are composed of a fast chang-

ing stream of facts. Invention, production, migration, war, peace, the role of women, prosperity, depression, mechanization, obsolescence, legal enactments, management and labor agreements, advertising, birth rate, turnover, and most of all the ambitions, abilities, and the restless spirit of man—all those and more are among the elements in this ceaseless flow. The stream of facts must be expressed as trends, and the point of view of the observer as outlook. To these considerations this volume directs the attention of the professional guidance worker.

HARRY A. JAGER, *Chief*  
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# Guide to Organization and Use of Handbook

This handbook is primarily a summary of the results and conclusions of recent studies of employment trends and long-range outlook in nearly 300 occupations of interest in vocational guidance.

Following the introduction and a summary of trends in population, labor force, industries, and occupations, the major part of the book consists of individual reports on each occupation. The reports are grouped into four sections, each prefaced by a summary of the major occupation fields: Professional, semiprofessional, and administrative occupations; clerical, sales, and service occupations; trades and industrial occupations; and agricultural occupations.

Within these sections, the occupations are further grouped by industry or field, with a brief introduction to each which points out the major characteristics and significant trends in the industry. The chapters introducing each major group show the occupations in perspective and in relation to each other. The individual reports summarize recent trends and outlook, together with the latest available data on earnings, on the kind of training and preparation required, on the background of the occupation, on the nature of the work, and the places in which members of the occupation are employed. The reports on agricultural occupations describe the major types of farms in 10 geographic regions, the kind of work involved, and the outlook.

The 288 occupations included in this first edition of the handbook are largely those found by the Veterans Administration to be of major interest to veterans requesting guidance. They are primarily occupations requiring relatively long periods of training—either formal education or training on the job—since to young people considering such occupations the need for information on the outlook is most acute. The occupations were selected also for their relative importance as a source of employment opportunity. Some

smaller fields are included, however, either because there was special interest in them among veterans, or because reports on them could readily be prepared in the course of the study of the larger occupations in the same industry.

These 288 occupations represent about 80 percent of the employment opportunities in professional and semiprofessional occupations in the United States; 75 percent of those in skilled occupations; 40 percent in clerical occupations; 30 percent in service occupations; smaller proportions of those in administrative, sales, and semiskilled fields; and the major types of farming. Thus, although they represent only a small part of the total number of different occupations in the United States, they cover some of the major areas of interest to veterans or students who are planning to undertake long courses of training or apprenticeship. This handbook may therefore be of service as a guide to the bewildering array of occupations in the United States.

Inevitably, many significant occupations could not be included in the first edition. In future editions reports on other occupations will be incorporated as rapidly as studies can be made, and the original reports will be revised to keep them up to date.

Certain types of information are not included in this handbook because they are readily available from other sources. There is a wealth of material on job descriptions, labor-market reports, occupational analysis, and relationships among occupations ("job families") in the publications of the United States Employment Service.<sup>1</sup> Counselors will find a description of opportunities for women and problems of women workers in the publications of the Women's Bureau, United States

<sup>1</sup> *Guide to Counseling Materials*, prepared by the U. S. Employment Service of the U. S. Department of Labor in cooperation with the U. S. Office of Education of the Federal Security Agency, 30 pp. Washington, 1946 (2d edition).

Department of Labor.<sup>2</sup> Information on employment problems of youth is published by the Child Labor Branch of the Wage and Hour and Public Contracts Divisions, United States Department of Labor.<sup>3</sup> Information on opportunities and earnings in each locality may be obtained from regional offices of the Bureau of Labor Statistics, community occupational surveys, or from occupational and labor-market reports of local offices of the State employment services. Apprenticeship standards in different occupations are presented in publications of the Bureau of Apprenticeship, United States Department of Labor.<sup>4</sup> Directories and guides of schools or colleges are listed in a recent publication of the United States Office of Education.<sup>5</sup>

The United States Department of Agriculture and the various State departments of agriculture publish information on opportunities in farming.<sup>6</sup> For those who are interested in opening a small business, the United States Department of Commerce has published a series of booklets describing the problems involved in establishing and operating various types of businesses.<sup>7</sup>

#### *How the Information Was Obtained*

Anyone who is trying to provide information on which young people can make a decision about courses of training and lifetime careers must try to look forward at least several years, and if possible several decades.

When the Advisory Committee on Education

<sup>2</sup> *Current Publications of the Women's Bureau*, may be obtained free of charge from the Women's Bureau, U. S. Department of Labor, Washington 25, D. C.

<sup>3</sup> *Child Labor and Youth Employment publications*, 3 pp., mimeo. May be obtained free of charge from the Child Labor Branch, Wage and Hour and Public Contracts Divisions, U. S. Department of Labor, Washington 25, D. C.

<sup>4</sup> *Publications of the Department of Labor*, U. S. Department of Labor, Office of Publications, Washington 25, D. C., January 1, 1948. Free.

<sup>5</sup> *What School or College?* by Walter J. Greenleaf. Misc. 3276, 4 pp. May be obtained free of charge from the U. S. Office of Education, Federal Security Agency, Washington 25, D. C.

<sup>6</sup> See, for example, *Suggestions to Prospective Farmers and Sources of Information*, 22 pp., multilithed, which may be obtained free from the Bureau of Agricultural Economics of the U. S. Department of Agriculture, Washington 25, D. C.

<sup>7</sup> A copy of a list of the "Establishing and Operating" Series may be obtained from the nearest field office of the U. S. Department of Commerce or from the Department, Washington 25, D. C. The nearest field office will also be able to supply copies of a series of small business aids which give information on such subjects as window displays and other topics of interest to small business firms.

recommended in 1938 that an Occupational Outlook Service be established, it was recognized that the analysis of occupational trends and outlook was a largely unexplored field. It was expected that it would be some years before results would be available; much basic work would first have to be done. Nevertheless, it was pointed out that the need for facts is great. Each year 1½ million young people enter the labor force. Many of them choose a vocation on the basis of no information or partial information or even seriously inaccurate information. If we can give these young people the best we have, even though it is not perfect, it will be of some help to them.

The problems of evaluating employment outlook are far from solved. From the point of view of job placement, for example, it would be extremely useful to be able to forecast changes in the level of employment in the course of the business cycle. Important as this is, it is extremely difficult and hazardous. However, the long-run trend is more important than short-run fluctuations for appraising employment opportunities in connection with the individual's choice of a lifetime occupation.

In the Occupational Outlook research program, emphasis has been placed on appraising the effect upon employment opportunities of long-run changes in the level of employment in each industry and occupation. For practical purposes in guidance, the assumption of favorable general business conditions was made in each case; at the same time, the effect of a business depression upon employment opportunities in the occupation is brought out. Some occupations suffer severely in depressions, while others have greater stability.

As a result of the first 7 years of research, the Bureau has found that it is possible in most cases to discern the major trends and suggest the outlook some years in advance. Conclusions are necessarily far from precise but often accurate enough to answer satisfactorily the questions in the minds of those preparing for a career.

The methods of appraising future demand and supply in each occupation which have been worked out on the basis of present experience differ greatly among occupations, since the factors affecting the outlook for one are often quite different from those which affect another.

In general, a number of lines of research are followed. Analysis is made of the growth and changing composition of the population; trends in technology; shifts in marketing and in the public's demand for different goods and services; the changing occupational patterns of industries; trends in employment in the various industries; developments in industrial relations; provisions of collective bargaining agreements; wage rates in various occupations; and industrial hazards. Trends in the supply of workers in each occupation are determined by analysis of statistics on the number of young people in training in colleges or vocational schools or by apprenticeship for each occupation, and by study of the losses of workers to each occupation resulting from death, retirement, or transfer to other occupations.

In the course of each study, trends are discussed with officials of industry, unions, trade associations, and professional societies, and the reports are checked and reviewed by them before publication, to insure accuracy and to obtain the benefit of their judgment and intimate knowledge of their fields.

The field of agricultural occupations is so broad that only a series of general statements about major types was prepared by the United States Department of Agriculture. The Department points out that even these statements are subject to wide variations within the areas discussed. Rapid changes in agricultural technology make it highly desirable for readers interested in agriculture to check further with county and township advisory committees, land-grant colleges, and farm associations.

The studies yielded much information of value in guidance in addition to the appraisal of the outlook for employment opportunities—such as trends in the type of training required by employers, the relative job security of the craftsman and the semiskilled worker, trends in licensure requirements, or the steps one must take to assure that he can practice his profession in more than one State. This information is incorporated in the reports.

How can the results of such studies be interpreted in the guidance of individuals? Necessarily, conclusions must be stated in general terms: Employment opportunities will be relatively fa-

vorable or relatively poor. It is the task of the individual, aided by the counselor or teacher, to match his personal interests and abilities against the demands of the occupation and the competitive situation which may be expected.

#### *Grouping and Definition of Occupations*

The occupational reports in this handbook are grouped, for the most part, according to the classifications used by the Bureau of the Census and in the Dictionary of Occupational Titles. In some cases, however, an occupation was placed outside its major group so that it could be included with the other occupations to which it is most closely related in practice. For example, railroad conductors are classified as a managerial or official occupation by both the Census Bureau and in the Dictionary; but in order to become a conductor one must be promoted from the occupation of railroad trainman, and it therefore seemed more suitable for the purpose of this handbook to place the report on conductors with other railroad occupations. These departures from the Dictionary and Census classifications were made only when it helped to clarify the story from the point of view of guidance.

To define what is covered by each occupational report, the Dictionary of Occupational Titles ("D. O. T.") code number is given under the title. In some instances the occupation as it is discussed here includes more than one occupation as defined in the Dictionary. This was found to be the best way to describe the field from the point of view of guidance because of the close relationship of the occupations in actual practice.

Often it was found more meaningful to discuss the semiskilled and the skilled levels in a single type of occupation together because a worker develops his skill gradually and the transition from one level to the other is not sudden or clear-cut.

#### *Interpreting Information on Number of Workers in Each Occupation*

The handbook gives figures on employment in each field wherever possible, both in charts and text, because the most useful single clue to the prospective employment opportunities in each occupation is the number of workers employed in it. Some occupations are growing; but rarely does an occupation grow so rapidly that the number of

new positions opening up each year is as great as the number of vacancies which arise as workers leave the occupation. Even occupations which are declining in size offer employment opportunities to many young people each year because of this turn-over. The majority of the job openings are due to the deaths, retirements, and transfers of workers to other fields.

Death and retirement rates vary among occupations, depending on many factors, including the nature of the occupation and the ages of workers employed in it. Carpenters, for example, are an older group of workers than automobile mechanics, on the average, because carpentry is an occupation of long standing, in which few young men were apprenticed in the depression years, whereas automobile repair work has existed for only a few decades and has grown rapidly, and has taken in many young men. As a result of this difference in the workers' ages, the rate of death and retirement for carpenters (of whom there were 766,000 in 1940) is about 3 percent a year, while that for the automobile and other mechanics (of whom there were 974,000 in 1940) is only half as much; and therefore the number of mechanics and repairmen who die or retire each year is less than two-thirds as many as the number of carpenters.

For most occupations in which men are employed the death and retirement rate varies from 1 percent to 3½ percent a year. The rate is usually somewhat higher in women's occupations because so many women leave to get married; for example, as many as 6 percent a year leave the nursing profession, according to a study by the Women's Bureau.

To make it possible to estimate the number of jobs which open up annually in each occupation because of deaths and retirements, the Occupational Outlook Service is developing tables of working life expectancy, similar to the actuarial life tables used by insurance companies as a basis for their premium and benefit rates. These tables have been used wherever possible in preparing the occupational reports in this handbook.

Jobs in each occupation open up also as workers transfer to other types of work. Little is now known about the movement of workers among occupations, but research is continuing on the prob-

lems of measuring this significant aspect of replacement needs.

### *Interpreting Information on Earnings*

Few people make an occupational choice solely on the basis of how much money they may be able to earn, but most people do want to have some idea of the earnings to be expected in the various occupations they are considering. For this reason, earnings information is given, insofar as possible, for each occupation in this handbook.

Most of the information on earnings comes from the surveys of the Bureau of Labor Statistics. In some occupational reports, other government or private sources were used. The most recent information available on each occupation is reported, and the date of the survey is given.

Where the earnings given are on an hourly or weekly basis, the reader may want to estimate roughly what the amount would be on a yearly basis by taking into account the information given on seasonality or irregularity of work. Similarly, when the worker receives tips or wages in kind—such as meals or lodging—or has to pay for uniforms, these points are brought out.

The significant thing to remember about the earnings information that can be given in so brief a report is that it reflects only an average and that, like every average, it conceals many variations. Earnings in an occupation may vary according to skill level, industry in which the worker is employed, size of plant, section of the country, and many other factors. Often earnings are different for men and women in the same occupation, or for workers in union shops and shops which do not have contracts with unions.

Information on earnings in a particular locality can often be obtained from the nearest regional office of the Bureau of Labor Statistics, or from employers, or union locals. The State employment service may have information on entry wages in some occupations.

It is important to bear in mind that for guidance purposes an individual wishes to know what the earnings in each occupation will be several years from now, when he has completed his training and is ready to enter the occupation. This cannot be predicted, of course. Wage rates, salaries, and earnings change rapidly and so does the price level, which determines what a pay check will buy. The

earnings information we can give on each occupation is valuable, however, in suggesting the relative position of the occupation as compared to others: Is it a low-paying field, or one which pays about the average, or is it a field in which earnings have been consistently high? Wherever possible, trends in earnings are reported, so that the steadiness or variability of earnings in the occupation is suggested.

#### *How To Obtain Additional Information on Local Employment Opportunities*

While many veterans or students who are interested in choosing an occupation do not necessarily expect to find one in which they can work in their home community, there are some to whom this is an important consideration. Workers in certain occupations expect to move occasionally from one city to another to find employment or to get a better job. This is true, for example, of engineers, chemists, business executives, workers in the construction trades and transportation industries, and many others. On the other hand, there are many occupations in which the workers are less attached to their field of work than to the city in which they live, and would choose an occupation only if they could be sure that there were local opportunities for employment.

The occupational reports in this handbook give information on employment trends and outlook in the United States as a whole, and also briefly suggest the geographical distribution of employment opportunities. To get information on current job opportunities and earnings for his own city or State the counselor should check with local sources.

The local office of the State employment service regularly surveys employment opportunities in its area and often has available complete occupational briefs for important local jobs. For professional occupations the local branch of the national professional society may be of some help. Similarly, the local office of a union will usually have information on employment opportunities in its field. Through the chamber of commerce and the classified section of the telephone directory lists of specific firms in each type of business may be obtained.

Finally, a more comprehensive source of information on local opportunities would be a com-

munity occupational survey. Information on how such surveys have been conducted in a number of cities is contained in a publication of the United States Office of Education.<sup>8</sup>

#### *Use of the Index to Occupational Reports Classified by Broad Fields of Work*

Someone choosing an occupational field needs full knowledge of the wide variety of occupations which may be open to a person with his specific interests and abilities. To widen the range of his choice, the counselor may want to call to his attention other occupations appropriate to his interests or abilities as shown in interest inventories, aptitude tests, hobbies, school grades, or in discussion with the counselor. For this purpose the counselor needs information on the occupations related to each broad type of work.

As an aid in the counseling and placement of young workers, the United States Employment Service devised an Entry Occupational Classification structure, published as part IV of the Dictionary of Occupational Titles. This classifies fields of work, rather than specific occupations. For example, there are such fields as musical work, literary work, child care, metal machining, mechanical repairing, graphic art work, machine tending, and so forth. Specific occupations related to each field of work are also shown. By using this information, it is possible to list a wide range of occupations which may be of interest to a person with a given set of interests or aptitudes.

The user of this handbook may identify the occupations described in the book which are related to each field by referring to the Index to Occupational Reports Classified by Broad Fields of Work, which begins on page 441. This index serves as a guide to the occupational reports included in the handbook, via the entry occupational classifications of the Dictionary of Occupational Titles. For example, a person whose ability lies in the field of artistic work may be interested in information on the occupations of commercial artist, industrial designer, fur designer, furniture designer, interior decorator, or photographer. For additional occupations related to this field of work, the

<sup>8</sup> Community Occupational Surveys by Marguerite Wykoff Zapoleon, U. S. Office of Education, Federal Security Agency, Washington. (Out of print.)

counselor may wish to refer to part IV of the Dictionary.

*How To Obtain Current Information*

Revised editions of the handbook will be issued from time to time to bring the information up to date and will include additional occupational reports. Their publication will be announced by the Bureau of Labor Statistics. The Bureau will be glad to place any user of this handbook on its mail-

ing list to receive announcements of these and other publications in the Occupational Outlook series, and current releases summarizing the results of new studies. Anyone wishing to receive these announcements should send the request to the Bureau of Labor Statistics, United States Department of Labor, Washington 25, D. C. Persons living in a city in which postal zone numbers are in use are requested to include the number in the address.



# Economic and Occupational Trends

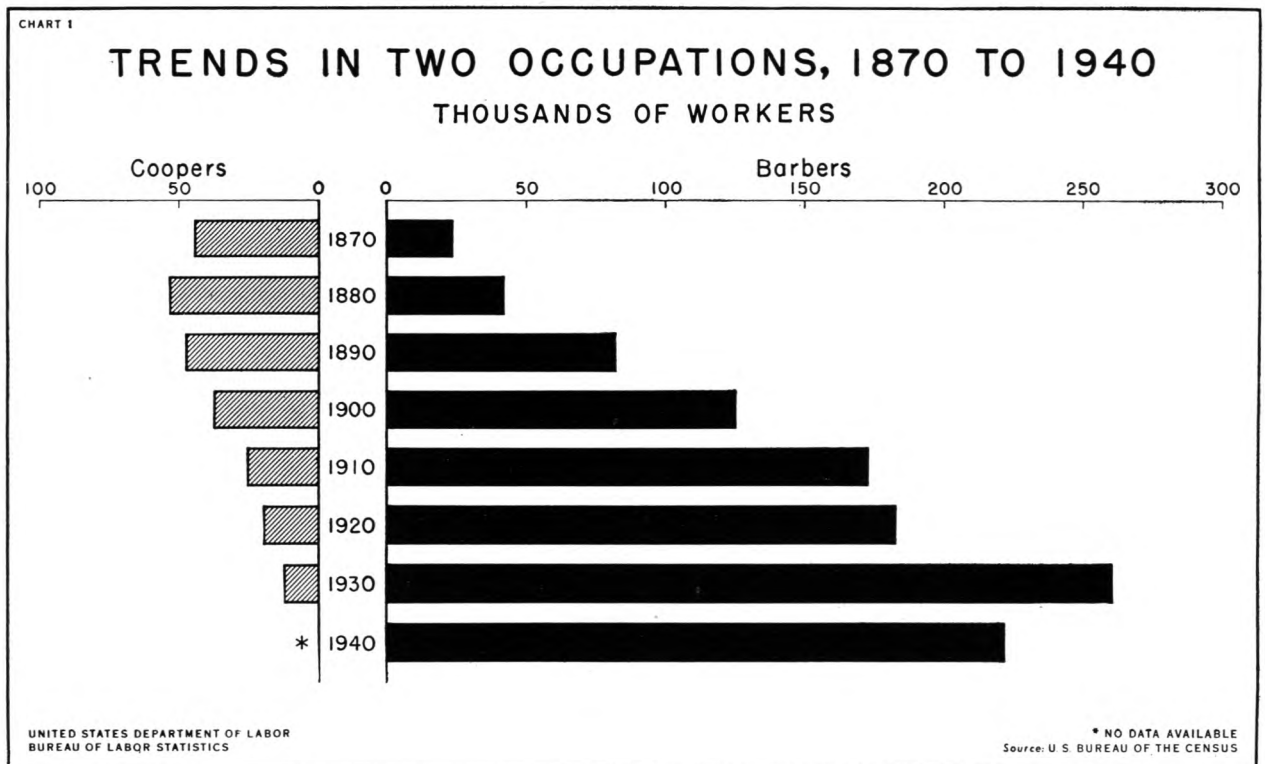
To the student learning about occupations, to the counselor engaged in explaining their intricacies, or to the person seeking information on which to base his selection of a course of training or a career, it is important to understand one thing fully: the rapidly-changing nature of our economic life.

Constant change is the most significant aspect of the occupational and industrial world in which we live. Technological, industrial, and social changes increase the need for workers in some occupations, reduce the demand in others, sometimes create new occupations and throw old ones into the discard, and constantly alter the content and character of every line of work.

The rapidity with which the occupational picture changes is illustrated in chart 1. In 1870 a

young man may have considered the choice between apprenticing himself to a cooper or to a barber. Both were skilled trades, with long historical traditions behind them. There were nearly twice as many coopers as barbers, indicating a somewhat broader choice of jobs and the need for more new workers each year. Yet, within the span of a man's life, the number of people who made their living as barbers increased more than tenfold, while employment opportunities for coopers shrank to one-fifth of their previous number.

What happened? With growth in population, a shift of population to cities, increases in average income, and changes in styles, the occupation of barber grew. On the other hand, the occupation of cooper declined as wooden barrels were displaced for various uses by steel drums, aluminum



kegs, paper sacks, paperboard boxes, and other types of containers, and because of the introduction of factory methods in making wooden barrels. Thus, because of population growth, technological improvements, social change, and the vagaries of fashion, one occupation grew tremendously, and the other fell into the discard.

To the young person looking forward to a lifetime of work—and that means nearly half a century—the fact that these changes occur is significant. To the best of our ability, we must try to anticipate the changes and provide as much information on trends as is possible. Although we cannot foresee nearly all that may happen, a real service will have been performed if young people are made aware of the dynamic character of the economy, and if they are prepared to expect changes and to adjust to them. This means maintaining the utmost flexibility and taking the broadest kind of training consistent with adequate preparation for a particular occupation.

To emphasize the changing character of occupational life, as well as to provide background and context for the reports on trends and outlook in each occupation, the growth and changing composition of population and the labor force, the major trends in industry, and their effect on broad occupational trends will be reviewed in the next few pages.

It should be noted first, however, that far greater than the changes shown by the growth of population, the labor force, industries, and occupations are the changes in status of individuals. If the labor force increases by one-half million in a

single year, it is because a million older workers died or retired and 1½ million young people left the schools and went to work. But this is only a beginning. The number of changes made by individual workers from job to job within an industry, between industries, from State to State, or from one occupation to another are much more numerous than the movements into and out of the labor force in any given year.

In 1947 an average of about three-quarters of a million manufacturing workers—1 out of 20—left their jobs each month.

In a 2¼-year period during the war, over 7 million civilian workers changed from one major occupation group to another.

Between 1935 and 1940—in a peacetime period—more than 3 million workers had moved from one State to another, and another 4 million had moved from one county to another within a State.

We have just begun in recent years to be able to measure the movements of individuals, and to appreciate the extent and significance of this type of economic change. These movements represent the adjustments people make to a changing environment. Without them the labor market could not function.

It is likely that most young people in school now will want to make similar changes in the course of their working life, either to improve their position, or because the change is forced upon them by loss of a job, poor health, or similar cause. This suggests once more the importance of flexibility in preparing for an occupation.

## Population and Labor Force

### *Population*

A basic factor underlying the occupational outlook is the trend in population growth. Changes in the size and characteristics of the population influence the amount and types of goods which will be demanded at various times. They also have a direct bearing on the size of the labor force, and on the characteristics of the persons available for work.

Until recent years, our history has been one of rapid population growth. The heavy influx of immigrants prior to World War I, the relatively high birth rate, and the constant reduction in mortality, all combined to increase our population rapidly from year to year. (See chart 2.)

Population growth, in the past, was closely associated with expanding economic opportunity. The growing size of our domestic market, combined with the rapid gains in technology, provided the impetus for large-scale expansion of manufacturing, railroads, public utilities, construction, and other types of business. Employment opportunities grew apace. Although there were, of course, great differences in the rate of expansion among different occupations, there were very few trades or professions which did not record a substantial gain in number, from one decade to the next.

In recent decades, however, there has been a slowing down in the rate of population growth. Restrictions on immigration as well as the long-term down-trend in the birth rate have tended to reduce the net additions to the population. During the depression years of the 1930's, in particular, there were sharp declines in the rates of marriages and births, reflecting the effect of unemployment and economic insecurity. As a result, the average annual rate of population increase dropped from 1.5 percent between 1920 and 1930, to only 0.7 percent in the following decade.

The outbreak of World War II interrupted this down-trend. There was a sharp spurt in births during the early war years. After a brief slackening during 1944 and 1945, when millions of young men were overseas, the birth rate mounted to extremely high levels during the first two postwar years.

A large part of the recent increase of births is viewed as temporary, resulting from the consummation of many marriages postponed by the depression and the war, or moved ahead by favorable economic conditions. However, the marriage and baby "booms" have already had a significant impact on employment trends, and will continue to influence the future occupational outlook. For example, the current high level of demand for consumer goods of all sorts, has been due in no small part to the fact that many more families have had to be housed and more children fed and clothed.

In the coming years, too, there will be a record demand for additional school facilities and teachers, as the new generation moves through elementary schools, then high schools, and colleges. By 1953, the number of children of school-entry age (the 6-year olds) is expected to mount to 3,300,000, or two-fifths more than in 1945. The total elementary school population—those 6 to 13 years of age—will probably continue to grow till 1956, while the corresponding peak in high-school entries is expected in the year 1961.

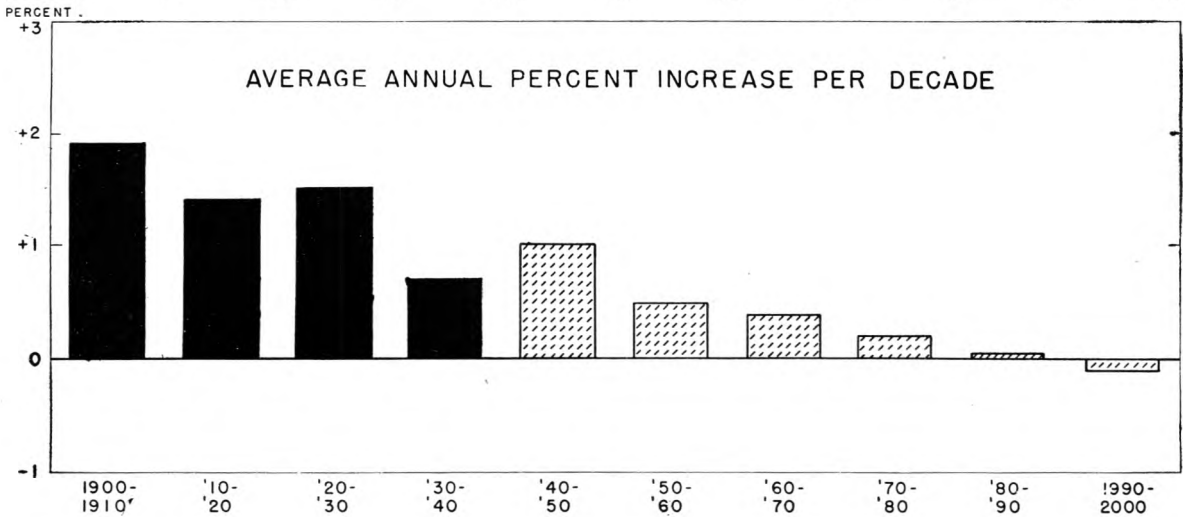
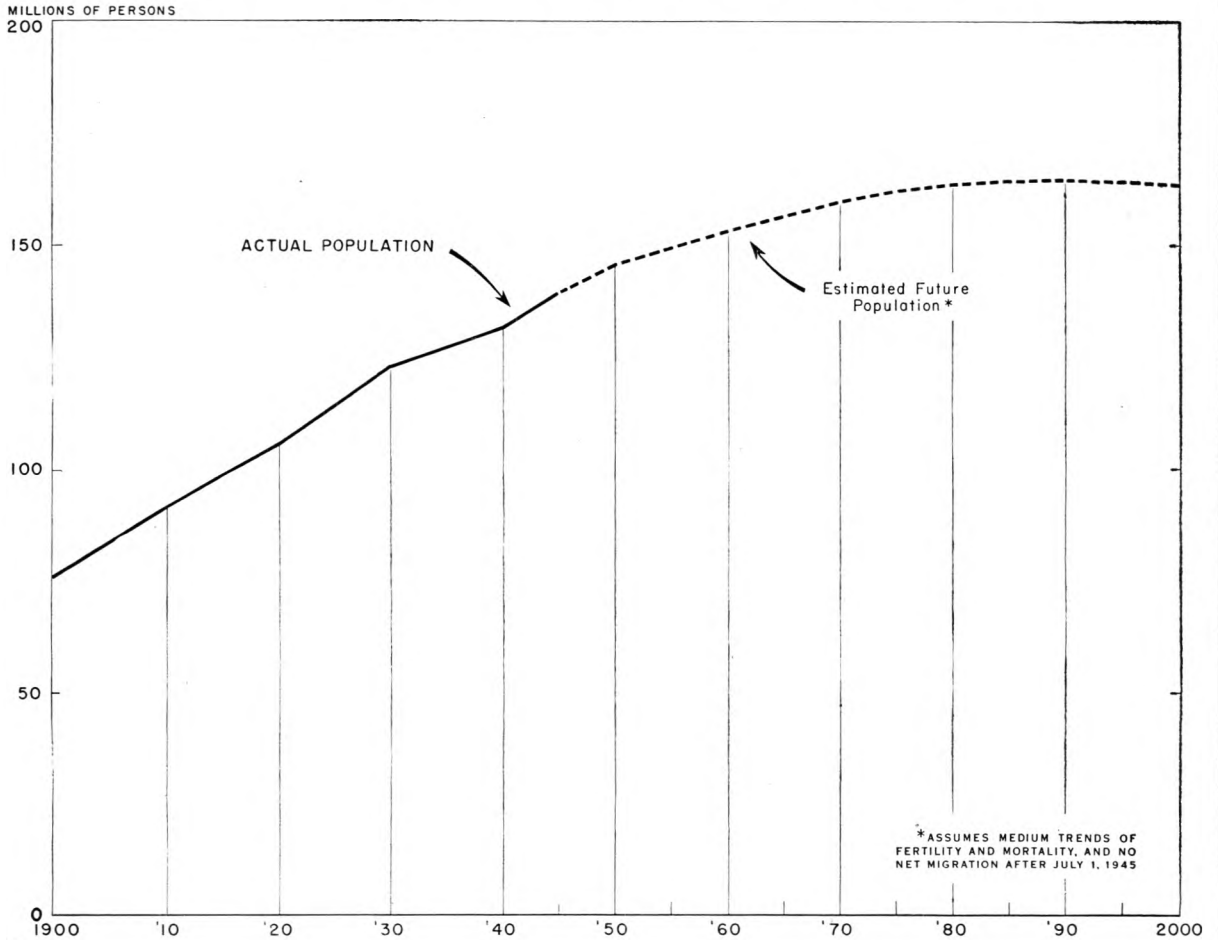
Beyond the horizon of the next few years, the outlook is still, however, for a continuation of the long-term decline in population growth. Unless large-scale immigration is resumed, the size of the population is likely to level off within a few decades, and may even begin to decline.

The transition from a period of rapid population growth to a stable or even declining population will carry with it very important implications for occupational outlook. It will tend to bring about significant shifts in our patterns of spending and saving, and in the distribution of workers among various industries and occupations. For example, with continued gains in productivity, a smaller proportion of our labor force will be needed for production of basic necessities, such as staple food items, and a greater proportion will be engaged in the production of those consumer goods and services which go with a higher standard of living. It will therefore become increasingly important to assess the relative trends in different lines of work.

A more stable population will also mean an

CHART 2

# POPULATION GROWTH IS SLOWING DOWN



older population. The long-run down-trend in the birth rate will reduce the relative influx of younger persons, while advances in medicine and sanitation will enable a greater proportion to live to older ages. The effect of these changes upon the composition of the population is shown in chart 3. By the end of this century more than 1 person out of 8 will be 65 years or older, as compared to 1 in 15 in 1940 and only 1 in 25 at the beginning of the century.

As the aged become an increasingly large segment of the population, we can expect increasing demands for medical services, for institutions to care for the aged, and for those types of goods and services which meet their needs. Problems of social security and old age assistance will come more and more to the forefront. And, at the same time, we can expect increasing efforts to provide more adequate employment opportunities for the older

worker, with emphasis on those occupations which are less exacting in their physical demands.

### *The Labor Force*

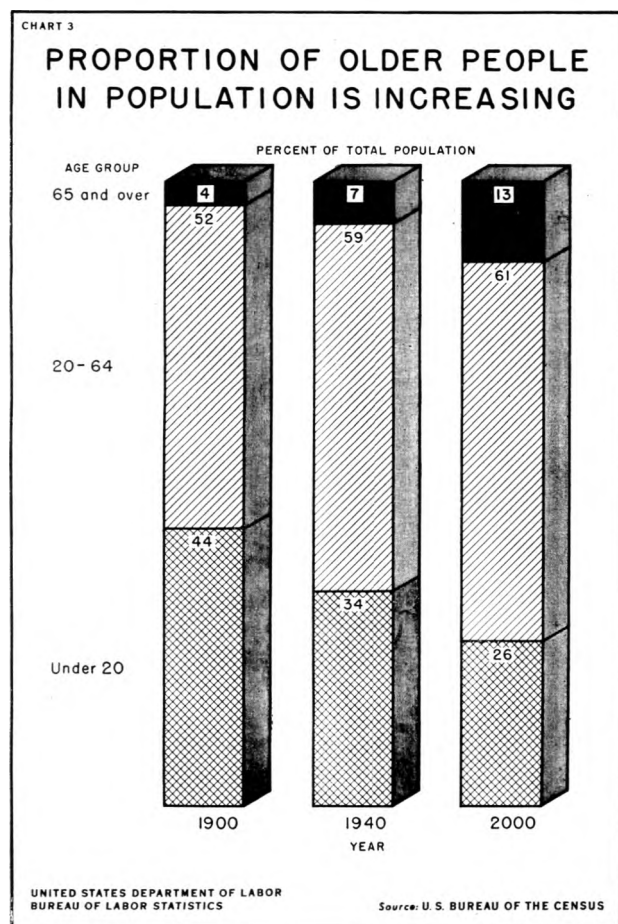
Although the growth of total population has great importance in occupational outlook, we are more directly concerned with those persons in the population who work or seek employment. The "labor force," as we shall refer to it, includes not only employees, who work for wages or salaries, but also farmers, businessmen, the armed forces, and the unemployed.

In the past, the growth of the labor force, from decade to decade, largely paralleled the increase of population. It expanded rapidly during the past half-century, from over 20 million in 1890 to 56 million in 1940. With the slowing down in population growth, there were corresponding declines in the rate of increase of the labor force. Thus, during the decade 1920-30, the average annual increase of the Nation's work force was about 700,000, or 1.6 percent; in the decade of the thirties, the annual increase had dropped to less than 600,000, or 1.2 percent.

Within the course of the next two decades, population trends will play a decisive role in labor-force growth. Relatively small additions to the population of working age are expected until the late 1950's because of the slump in marriages and births during the depression. In the following 10-year period, however, the very large generation of youths born during the war and the early post-war years will join the working population, and there will be a sharp increase in labor-force growth. After the decade of the 1960's the growth in the population of working age is again expected to slow down.

The long-term slowing down in labor-force growth means that an increasing proportion of the new entrants into the labor market will represent replacements for those leaving because of death, retirement, or other reasons. In order to estimate prospective job openings in different occupations, the study of the age distribution of persons at present in the occupation, and of other factors influencing the rate at which workers are likely to withdraw, will therefore become increasingly important.

Apart from over-all population trends, there have been significant changes in the extent to



which men and women of different ages have participated in the labor force. Almost all able-bodied adult men between the ages of 25 and 55 normally work or seek work. Over the years, there has, however, been a steady increase in the proportion of women working outside the home, while the proportion of workers among youth and among older persons has been declining. The proportion of workers in 1940 in the different age and sex groups of the population, 14 years of age or over, is shown in chart 4.

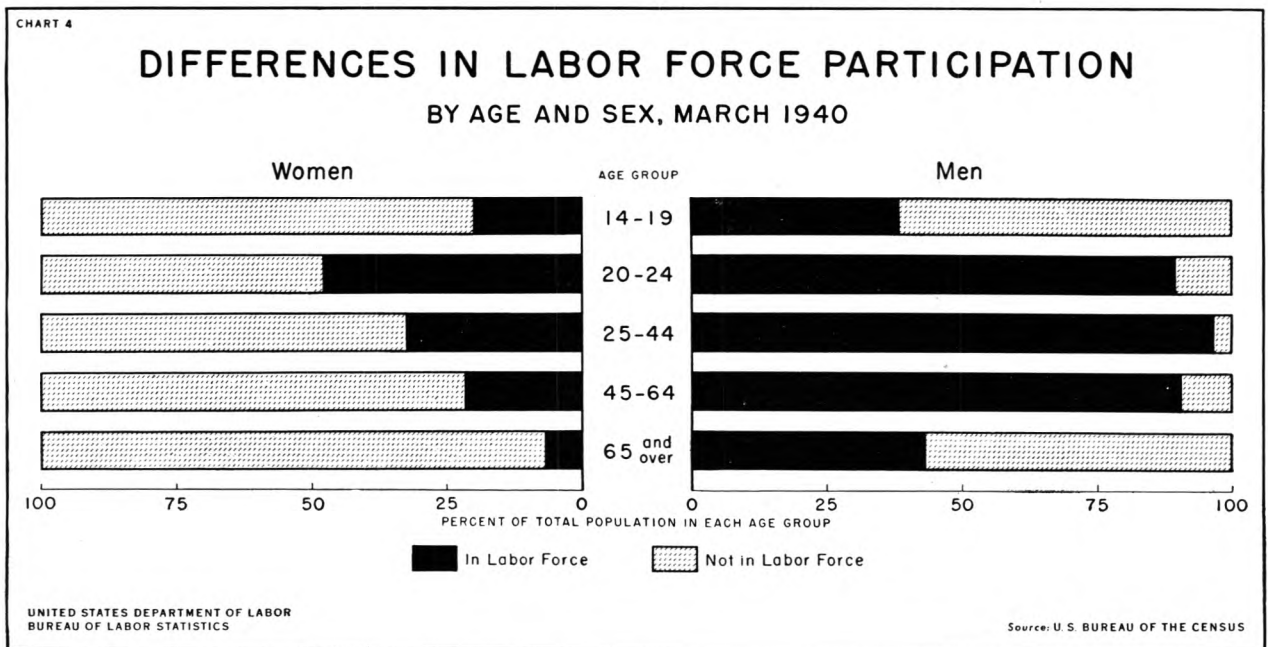
The movement of women into gainful employment has resulted from a combination of forces. The shift of population to the cities and the increased importance of the white-collar occupations, for example, resulted in a great expansion of employment opportunities for women. At the same time, the decline in the size of families and the introduction of labor-saving household devices made it possible for growing numbers of women to accept jobs outside the home.

However, despite these gains in employment, we should note that only about one-third of all women aged 20 to 64 were actually in the labor force in 1947, and that the great majority of married women, particularly those with small children, still devote their full time to household work. With the increased application of science to household management and to child care, there is in

fact a growing need for adequate training in home economics and related fields, as well as along strictly vocational lines.

In contrast to the trend for adult women workers, the proportion of youth in the labor force has been declining. There has been a steady lengthening in the period of schooling, partly because of compulsory school-attendance laws, but mainly because our complex society has required a greater period of formal training. As a result of the war and of the high postwar level of job opportunities, there are currently relatively more teen-aged youth at work, and fewer in schools, than might be expected from prewar trends. On the other hand, large numbers of older veterans, who would normally be expected to be in the labor force, are currently attending schools and colleges under the provisions of the Servicemen's Readjustment Act of 1944 (as amended), commonly known as the GI Bill of Rights. Within the next few years, as most of the veterans complete their courses, we can expect a renewal of the trend toward longer schooling among the teen-age group. With the large potential increase in the number of college graduates, advanced education will, in fact, become more important than ever before as a means of entry into the better-paid occupational fields.

The proportion of older people, particularly those 65 and over, who were in the labor force





force in the Great Plains area, stretching from North Dakota to Oklahoma, is actually beginning to decline (see chart 5). Between these two extremes are the South with a rate of growth about 25 percent above the national average and the great industrial region east of the Mississippi and north of the Ohio where the labor force is growing at a rate about 25 percent below the national average.

These regional variations are a product of a large volume of migration between the various States superimposed on great interstate differences in the rate of natural population growth. On the basis of natural growth, the South with its predominance of rural areas and high birth rate, would have the fastest growing labor force in the Nation, but the actual growth is slowed down by movement of southerners to other regions where economic opportunities and income levels are more favorable. On the other hand, the Pacific Coast has by far the slowest rate of natural increase, but

the great inflow of migrants causes this area to have the fastest growing labor force. In the Great Plains States the natural rate of growth is about on a par with the national average, but the exodus of migrants from this area has halted labor-force growth and will probably cause a decline in the working population over the next few decades.

The great interchange of population among the various regions of the country means that no one region, or locality, can attempt to evaluate its labor-supply prospects without regard to what is happening in the Nation as a whole. For example, a rapidly growing area such as the Pacific Coast must take into account the probability of a continued heavy in-migration of workers from other parts of the country. Depressed conditions in other regions might accelerate this inflow; on the other hand, if the ability of the Pacific Coast area to absorb additional workers were reduced, and its unemployment increased relative to the national level, the inflow would probably slow down.

## Industrial and Occupational Trends

### *Industrial Trends*

Seventy years ago more than half the people who worked for a living were employed in agriculture. The United States was mainly a country of farmers; its ways of living and habits of thinking were influenced by this fact. Indeed, today, in any group of students in a city school, there will very likely be some whose grandparents, or even parents, lived and worked on a farm.

The significant change that occurred in the last 70 years—the rapid growth of industry, commerce, and other nonfarming employment—is shown in chart 6. The number of nonfarm workers grew from 6 million in 1870 to 51 million in 1947, while the number of farmers and farm workers increased from about 7 million in 1870 to a peak of 11½ million around 1910, and since then has actually declined to about 7.7 million in 1947.

On any farm today one can see some of the reasons why this happened. The farmer has machinery which makes it possible for him to cultivate many more acres than could the farmer years ago. With tractor and trucks both on the farm and in the city, much less feed is needed for horses and mules. About 50 million acres that once grew feed

for work stock is now in food crops or in feed for cattle, hogs, and poultry. Moreover, farmers use fertilizer and better seed. Science and experience have taught them how to get more out of their farms. In 1944, the average farmer produced nearly twice as much as did the average farmer just before World War I.

With these improvements in farming and in storage and transportation of food—canning, refrigeration, and warehousing, for example—the farms of the United States were able to provide food and other farm products for more and more people. This made it possible for a larger proportion of the population to take jobs in industry.

The industrialization of the country resulted in an increasing productivity of labor because of the wider use of machinery, better management of production, and a better-trained labor force. As a result of increased productivity, incomes and the standard of living have been rising. With more purchasing power at their disposal, people have bought more and more goods and services, and many new industries have developed. Government and private services in such fields as education, medical care, public health, and welfare have



expanded. These developments help to explain the changes in employment noted below.

Recent trends in employment are shown in chart 7, which extends from 1929 through the depression, the war, and the postwar period. In the top line is seen the gradual growth of the labor force and its rapid increase during the war, as students,

about 1½ million in 1929 to nearly 13 million in 1933.

Then began a slow recovery, temporarily set back by a recession toward the end of 1937. By 1939, the year the war began in Europe, nonfarm employment had increased by 7½ million from the low in 1933, but was still a million below its average in 1929. Unemployment had been reduced by only 3½ million from the peak of nearly 13 million, however, since the labor force had continued to grow. It was particularly difficult for younger workers and older workers to get jobs.

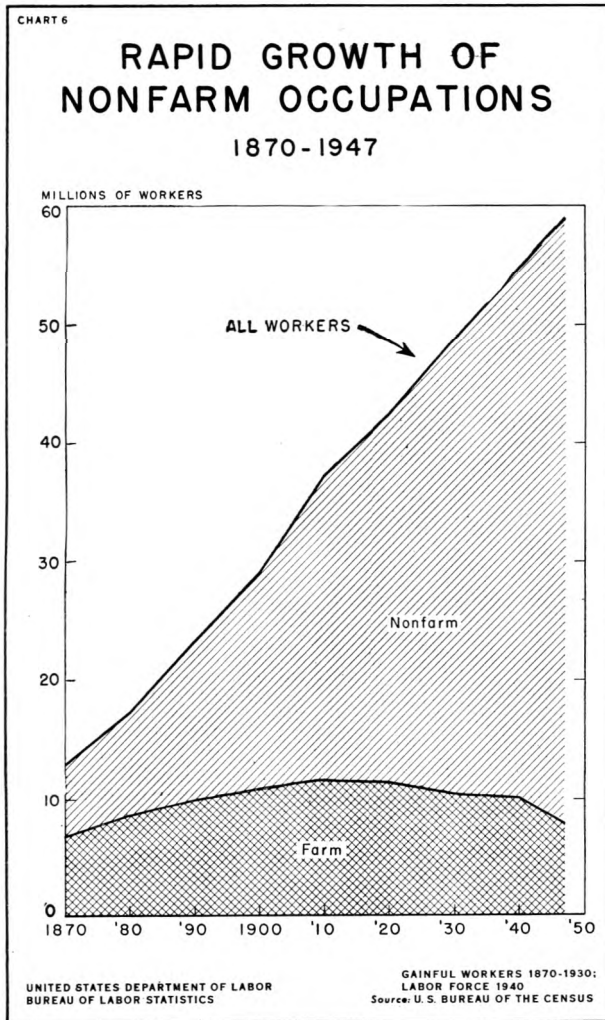
Those in school today may not remember the depression years and their attitudes are influenced more by the conditions of relative prosperity since 1940. Yet the thinking of their parents, of their teachers, of the employers for whom they may work, of the unions they may join, and of the leaders in public life is strongly affected by the experiences of the thirties. It will help in understanding much of the information on occupations given in the reports in this handbook if one has a realization of the difficulties of those years.

Among the general effects of the depression decade upon occupations were these:

1. Young people found it particularly hard to get jobs. The rate of unemployment was high among them, despite the fact that many continued in school and were not classified as unemployed. Older workers also found it difficult to get jobs.

2. Employers, faced with many job applicants and the necessity to save money by having only the most efficient workers, raised their hiring standards. The best-trained or experienced workers got the jobs. This hastened a long-term trend toward a preference for applicants who had more education. Where grade-school graduation had been considered adequate, employers began to specify that they wanted only high-school graduates; where high-school graduation had been a requirement employers began to give preference to the college-trained person.

3. People got jobs where they could, and so there was a great deal of occupational shifting down the scale of skills. Many a professionally trained and experienced worker took a clerical, sales, or semi-skilled job. Many a craftsman worked in semi-skilled or laborer jobs. Their skills grew rusty from disuse.



women, and older workers came in to meet the demands of the armed forces and civilian industry for manpower.

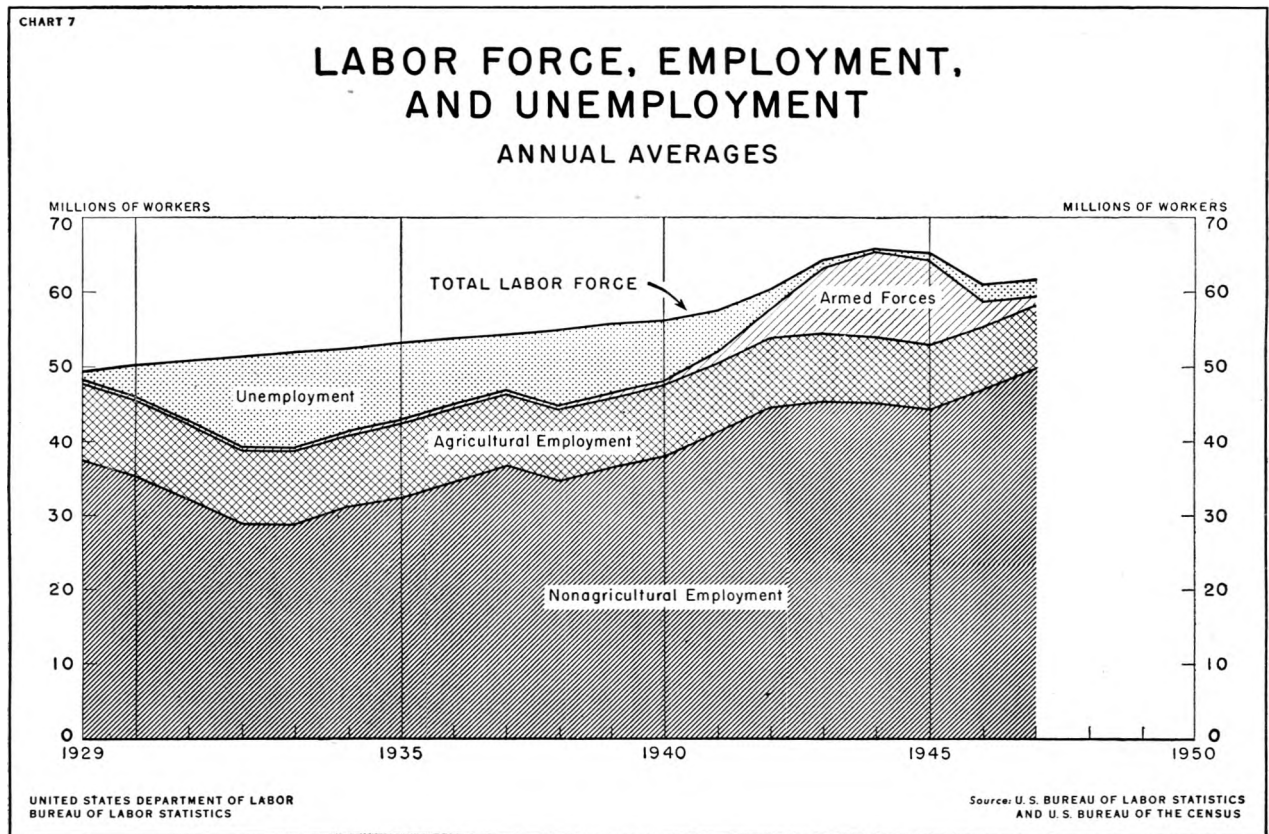
The severe drop in employment in nonfarm industries that marked the onset of the depression—from 37 million in 1929 to a little less than 29 million in 1933—is also shown. As a result of the drop in employment and the growth of the labor force, the number of unemployed increased from

4. To preserve the employment security of their members, and to prevent poorly trained people from entering their fields, some unions and professional societies took action to tighten up entrance requirements. Often this went hand in hand with the improvement of training. In the professional fields, particularly, it represented the continuation of a long-term trend towards raising the standards of education and training.

5. Earnings, of course, dropped in nearly every field of work.

production of munitions, nonfarm employment rose rapidly from 36 million in 1939 to 45 million in 1944. The armed forces, which had averaged about 300,000 throughout the decade of the thirties, added 11 million more men and women within 4 years. As a result, the number of unemployed dropped from 9½ million in 1939 to about three-quarters of a million in 1944.

Hiring standards which had been stiffened during the depression were relaxed. Skilled jobs which had required a long period of training were



6. In an effort to share what work there was among as many people as possible, the workweek in industry was shortened. This was again a continuation of a long-term trend. The Fair Labor Standards Act, which became law in 1938, required that workers covered by its provisions be paid time and one-half for work in excess of 40 hours in 1 week. In a number of industries an even shorter workweek of 35 or 36 hours was agreed upon by unions and employers.

Then came the war. As industry swung into

broken down so that the work could be done by a number of quickly trained workers, often under the supervision of a skilled worker. Young people found it easy to get a job, and often at pay that made their father wonder why he had spent 25 years learning and gaining experience in a trade. Older workers postponed their retirement because their skills were needed in industry and they could earn good pay. Women whose children no longer needed their care came into the labor market.

As the war approached its end, many people, remembering the depression from which the war had pulled the country, were afraid of a postwar recession. They feared the number of unemployed would skyrocket when the millions of workers engaged in munitions production were laid off, and the more than 11 million men in the armed forces were demobilized, many of whom had had no experience in civilian occupations.

Although there was a sudden drop in employment when munitions production stopped, other industries quickly hired the workers. Stimulated by rising demand for the products that had not been available during the war, such as new houses, automobiles, and washing machines, industry hired more and more workers until, at the end of 1947, with the armed forces demobilized from over 11 million to less than 2 million, about 60 million people were employed. The number of unemployed did not rise above 3 million at any time, and toward the end of 1947 was less than 2 million.

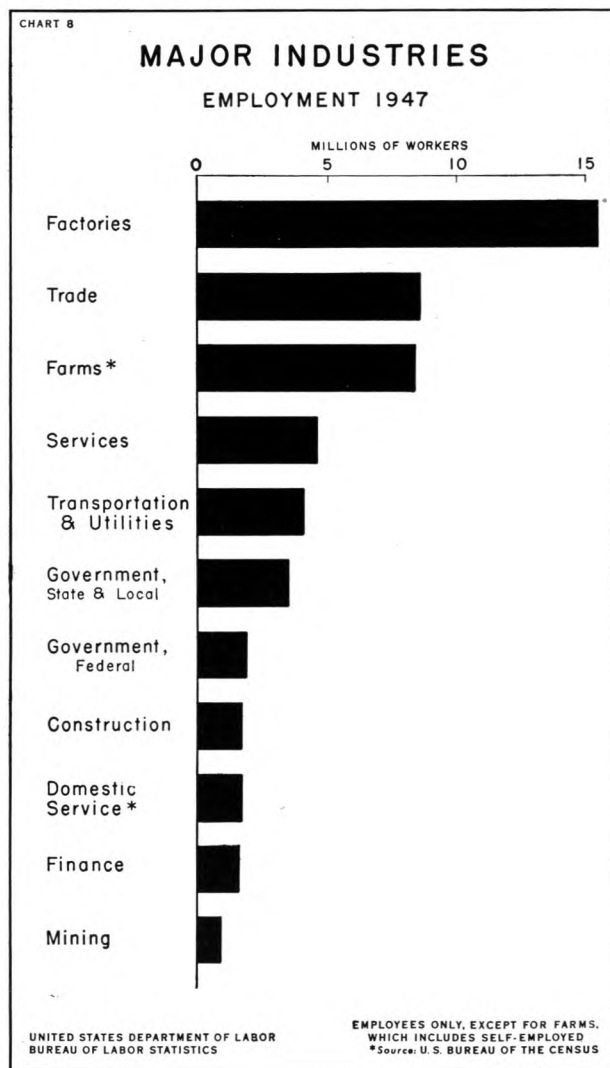
Thus, the country weathered the period of adjustment from war to peace better than many people had expected. For the time being, at least, the Nation had attained, as it entered 1948, conditions close to a state of full employment. It was relatively easy to get a job, the "Help Wanted" signs were up, and most of the unemployed were persons who were out of work for only short periods between jobs. This did not mean that everyone could get the job he wanted, but the fear of complete unemployment for long periods was at least temporarily banished.

Many young people who, according to previous custom and practice, would have been expected to be in school, were in the labor force. This may well continue as long as jobs are so easy to find; but these young people may later regret not having finished school. Older workers, too, have remained at work because of the attraction of good pay, in preference to retirement on pensions that the increased cost of living has made inadequate, and because their services were wanted.

In the first half of 1948, employment in the United States was higher than it had ever been before. The major industry fields and their relative importance as a source of employment are shown in chart 8. In studying this and the following charts, it would be well to bear in mind that

the size of each industry or occupation is a clue to the employment opportunities.

Manufacturing industries employ the largest number of people, and offer jobs to many different kinds of workers—the unskilled laborer, the machinist, the engineer, the stenographer, the produc-



tion manager, and, more than any other type of worker, the semiskilled machine operator. Four out of 10 employees of manufacturing industry were semiskilled workers in 1940.

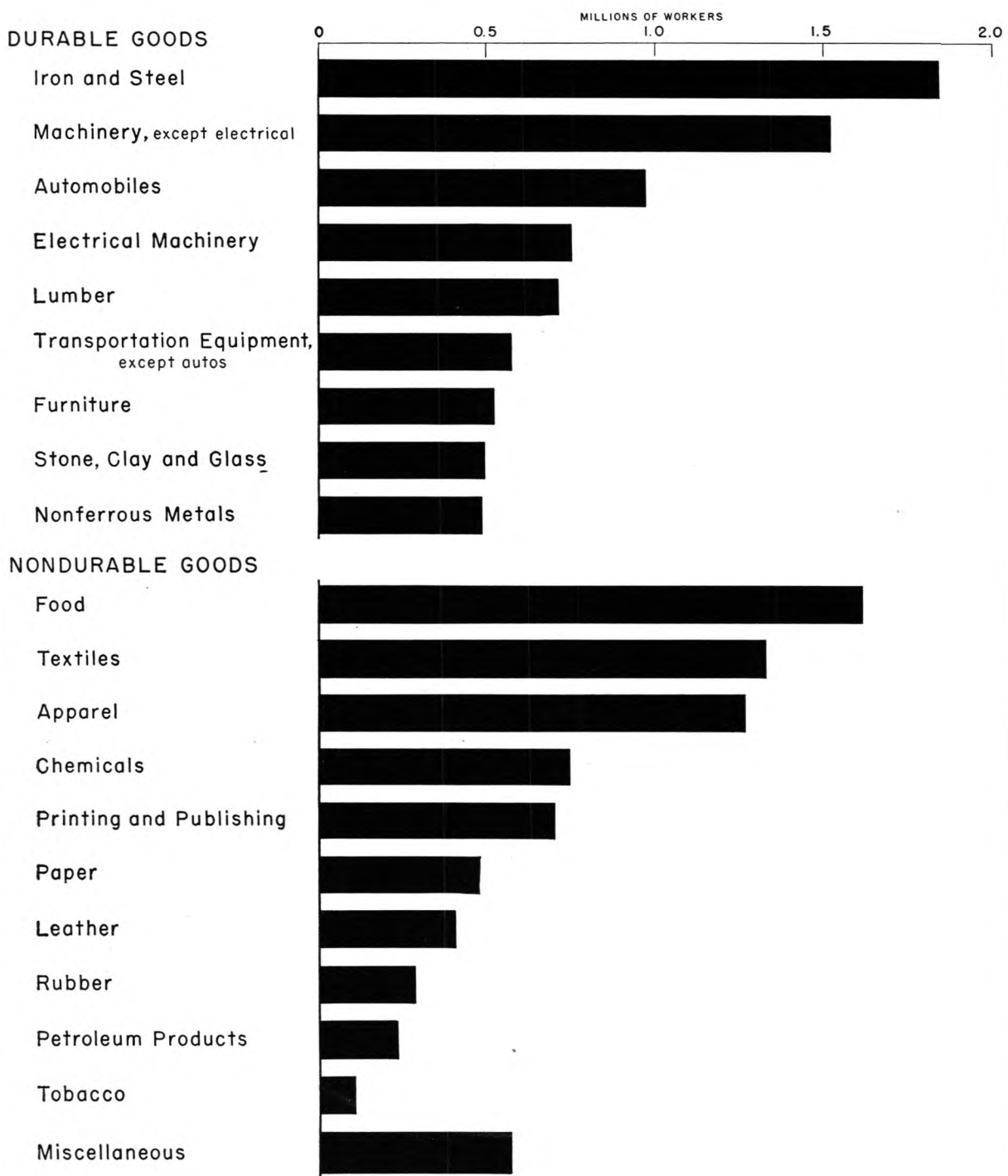
The major manufacturing industries are shown in chart 9. About half the workers are employed in the durable goods manufacturing industries, the others in the nondurable goods industries.

Largest among the durable goods industries are

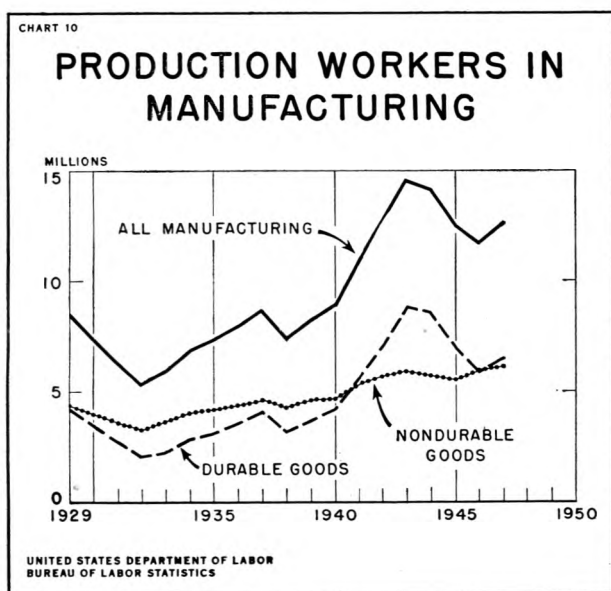
CHART 9

## MAJOR MANUFACTURING INDUSTRIES

### AVERAGE EMPLOYMENT 1947



the metalworking group. These plants make a great variety of products, such as steel beams and pencil sharpeners, automobiles, and hairpins, giant dynamos which generate electric power, and tiny incandescent lamps which put the electricity to work in our homes. During the war, plants making consumer goods such as washing machines and lipstick holders shifted over to the manufacture of antiaircraft guns and cartridge cases, and the small aircraft and shipbuilding industries grew to enormous size. Though they now have fewer workers than during the war, the metalworking industries are producing far above their prewar levels, in trying to meet the great demand for their products. This demand is sustained by the generally high income levels of the postwar period.



Employment in the woodworking and building materials industries follows closely that in the construction industry. More lumber, window glass, structural tile, and furniture are sold in years when a large volume of homes and other buildings are put up.

The major nondurable goods manufacturing industries are those which make textiles, clothing, and food. The chemical industries and the printing and publishing industries are also large.

Employment in manufacturing drops severely during depressions and rises sharply during periods of good business conditions, as can be seen

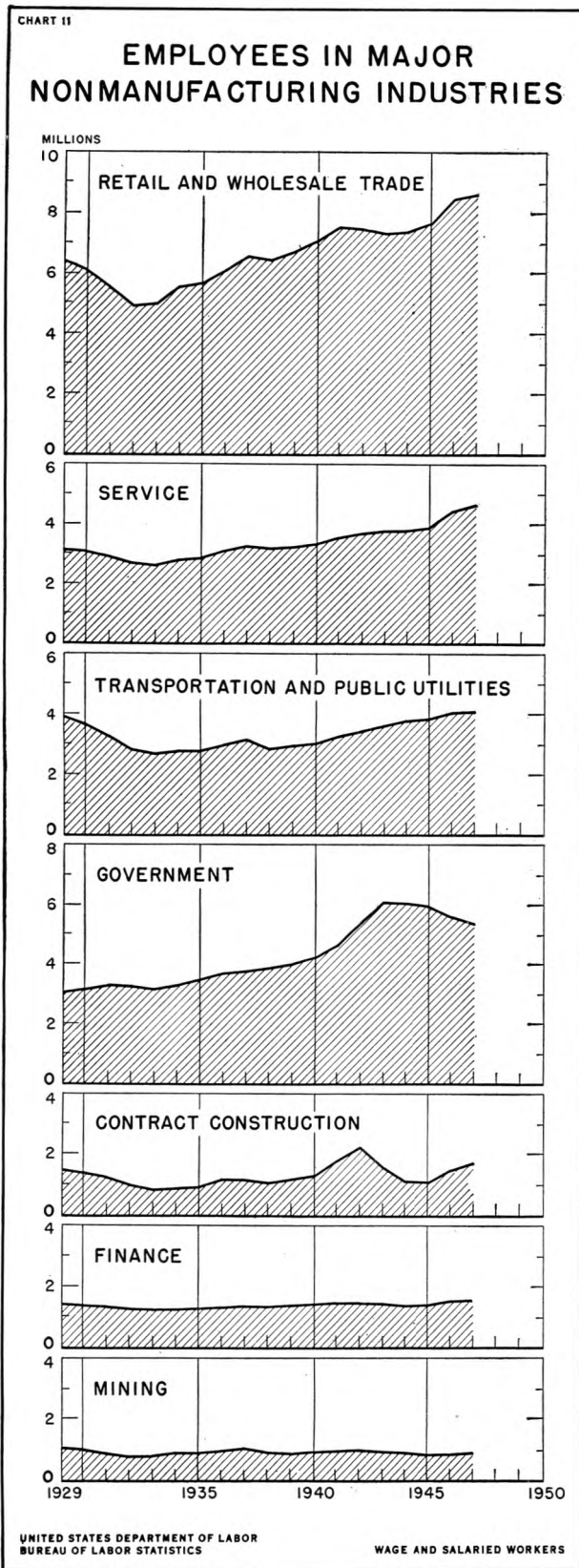
in chart 10. It is the durable goods industries which have the greatest ups and downs, because when people have no money they can postpone buying homes, automobiles, and washing machines much longer than they can put off buying food and clothing. Similarly, businessmen can put off buying new machinery. Manufacturing employment dropped by about 35 percent from 1929 to the bottom of the depression, and then began to recover. During the war, employment shot up by 7 million, mostly because of the expansion of metalworking industries. The amount of goods produced increased even more than this, because people worked longer hours during the war. Since the end of the war, employment has been lower, but still far above the prewar level.

When the backlog of demand for automobiles and other durable goods that could not be bought during the war is worked through, manufacturing employment may not be as high as it is now. And if another depression should come, these industries and their workers will once again suffer as they did during the thirties.

Retail and wholesale trade have more than 8 million employees, and in addition provide a living to well over a million proprietors. Salesmen and saleswomen constitute the largest group of employees in trade, but there are also large numbers of clerical workers (who keep the records and send out the bills), truck drivers and delivery men, and service workers, such as elevator operators and porters.

Employment in trade fell during the depression but recovered quickly and by 1937 was higher than in 1929 (chart 11). In this can be seen the effect of the long-term upward trend in this field of work. Employment increased further before the war, and since the war has risen to a level more than 2 million higher than the 1929 peak. One of the factors in the growth of this industry has been the increasing amount of services of all kinds provided for customers.

Farming, though it has lost workers in recent years, is still one of the largest fields of work. In addition to nearly 6 million farmers who own and run their own farms, there are a large number of people who work as farm laborers. Their number fluctuates seasonally—about 2 million are employed in the winter, and well over 4 million farm laborers are employed in the summer. Many of



those who work during the peak season are students and housewives or are in other occupations during the rest of the year.

Government employment—local, State, and Federal—was over 5 million in 1947; more than two-thirds of the workers were in local and State governments, employed largely as teachers, nurses, engineers, typists, and policemen. In shipyards, arsenals, and printing plants the Federal Government employs many workers in industrial occupations. Although people often think of the clerical worker as the typical Government employee, only one-fifth of the Government workers were in this category in 1940. One of the largest Federal occupations is that of mail carrier.

In line with a long-term trend, employment in government has been rising fairly steadily since 1929, dropping back only slightly from 1931 to 1933, increasing in the thirties and rising sharply during the war. Government is providing increased services through the schools, public health and sanitation, welfare work, and similar fields. A larger defense establishment, services to veterans, and a growing amount of research has also increased the number of government employees.

In addition to the civilians employed by the Federal Government, there were over 1.4 million men in the armed services at the end of 1947—a large increase when compared to an average of 345,000 in 1939. The largest branch is the Army, with a strength of over 900,000 in December 1947. The Navy has over 400,000 men, the Marines 89,000 and the Coast Guard 20,000. These figures include 17,000 women who were in the services at the end of 1947. The armed forces use men and women with many different kinds of skills, such as machinists, airplane mechanics, or electricians, and give courses of training in these fields (see p. 454).

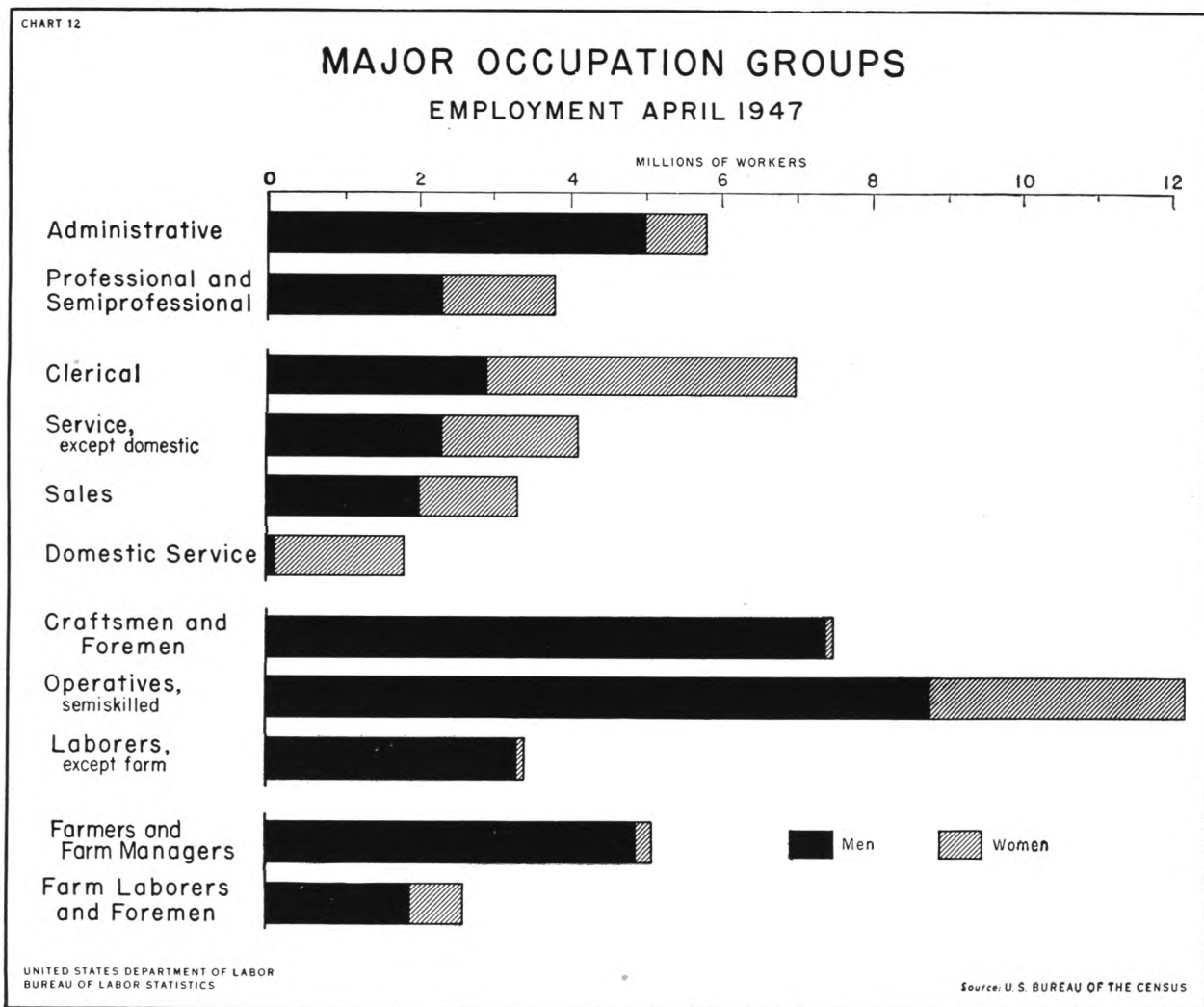
Service industries employ more than 4 million people in such diverse fields as automobile and other repair shops, laundries, cleaning and dyeing establishments, hotels, barber shops, theaters, motion-picture production, advertising, and many other categories not commonly thought of as in the service field. There has been a long-term upward employment trend which was interrupted for only a short time in the depression. Recovery was quick, however, and during the war, workers were recruited by drawing people partly from the do-

mestic service field and from among persons outside the labor force.

In the transportation and public utilities industries major fields are the railroads, trucking companies, bus and transit lines, telephone and electric-power companies, and the merchant marine. Air lines and radio and television broadcasting are smaller fields, but are of considerable interest in vocational guidance. These industries employ about 4½ million workers with many different kinds of skills, such as locomotive engineers, truck drivers, telephone operators, musicians, engineers, seamen, ticket agents, and pullman porters. The great majority of the workers are men. By far the greatest portion of the women employed in these industries are clerical workers.

Employment dropped sharply in the early thirties, and did not return to the 1929 level until after the war. During the war, improvements in efficiency and longer hours of work made it possible for the railroads to carry a record amount of freight with fewer workers than in 1929. The public utilities were able to reduce employment by cutting down their installation and service work; since the war they have expanded a great deal.

The construction industry had an average of nearly 1¾ million employees in 1947. This industry is noted for sharp variations in employment; between 1929 and 1933 employment dropped by nearly one-half. An unusually high proportion of this industry's workers are skilled men (carpenters, plumbers, etc.); however, there are large



numbers of laborers and of semiskilled workers such as truck drivers. The few women employed in this industry are mostly clerical workers.

Finance, as a major field of work, includes principally banking, insurance, and real estate. The most common occupations are clerical. There has been a long-term upward trend in these industries; by 1941 employment had recovered to above the 1929 level, and, after dropping during the war, reached a new high in 1946 and advanced further in 1947. This increase reflects the activity in building and real estate, increases in the purchase of insurance, and the expanding use of banking facilities in the postwar period.

In mining, which includes mainly coal mining, ore mining, quarrying, and oil and gas extraction, less than a million workers are employed. The largest occupation group is, of course, the miners who dig out the coal or ore by hand, or by machine, or blast it out by explosives. There are opportunities for large numbers of other workers in the industry too.

The long-term employment trend has been downward as machine mining methods have increasingly supplanted pick-and-shovel mining. There are many mines, however, where hand methods are still in use because it does not pay to introduce mechanical cutting and loading equipment.

### *Occupational Trends*

While the industrial picture of the United States shows where people work, the occupational picture in chart 12 shows the kinds of work they do.

It can be seen that by far the largest group is the semiskilled workers, of which machine operators in factories and truck drivers are typical examples. Skilled workers are the next largest group, and clerical workers the third largest.

Many young people considering the choice of an occupation single out one of the professions as their goal. Not many will be able to enter these

fields, however, for they give employment to only 7 percent of all workers. The whole group of "white collar" occupations, which may be broadly interpreted to include the groups near the top of chart 12—professional and semiprofessional, administrative (proprietors, managers, and officials), clerical, and sales workers—consisted of only about 35 percent of all workers.

The principal occupations within each major group will be described in later sections of this handbook, together with the trends in each broad field. At this point, only the long-term trends in the size of each group relative to the others will be summarized.

Since 1910 the farm, farm laborer, and nonfarm laborer occupations have been claiming a smaller and smaller proportion of the workers (chart 13). As machinery has been introduced in industry and on the farm, the machine operator who is a semiskilled or skilled worker has taken the place of the unskilled laborer. As a result, the semiskilled group has been growing rapidly while the laborer occupations declined. This trend has been further advanced by developments since 1940.

The skilled occupations just about held their own over the three decades 1910 to 1940, but since 1940 have increased their share of all workers.

The other fields—clerical, sales, administrative, professional, and service—have been increasing in relative size. However, this has not been true of domestic service (which is not shown separately in the chart).

These occupational trends arise in part from the basic industrial changes described above; namely, the growth of nonfarm industries, and the expansion of trade and service industries which employ large numbers of workers in clerical, professional, service, administrative, and sales occupations. Technological developments and changes in style or custom also affect the numbers of people employed in different occupations.



CHART 13

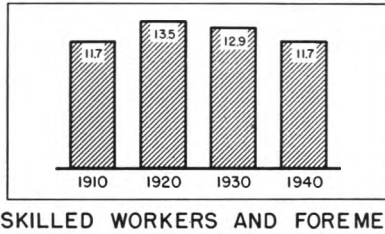
# OCCUPATIONAL TRENDS, 1910-1940

PERCENT OF TOTAL WORKERS ENGAGED IN EACH FIELD

## FARM AND UNSKILLED LABOR OCCUPATIONS DECLINED...



## SKILLED WORKERS HELD THEIR OWN...



## ALL OTHER FIELDS INCREASED...

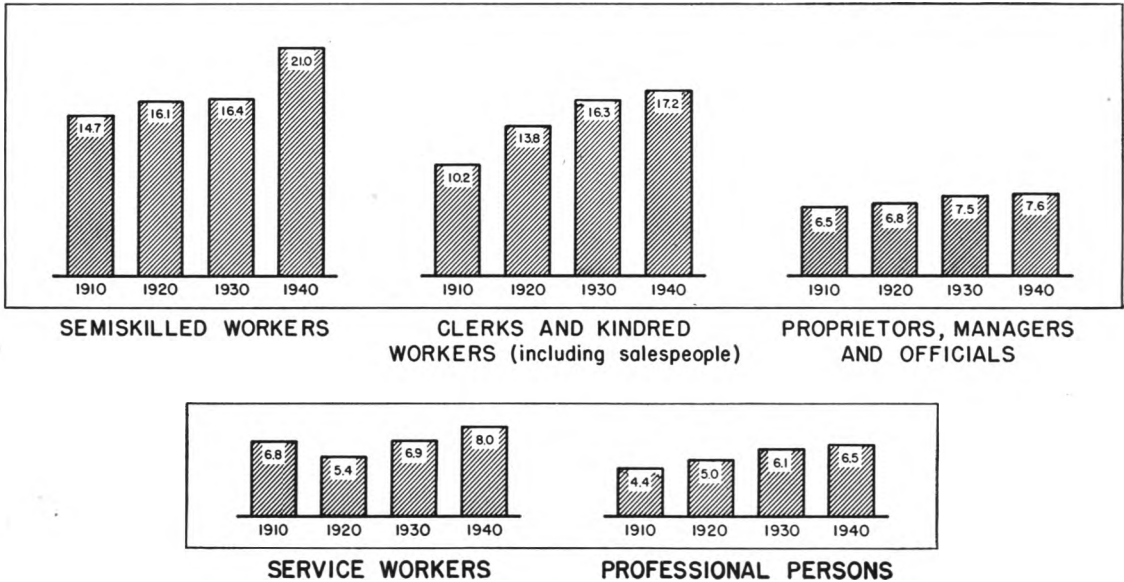
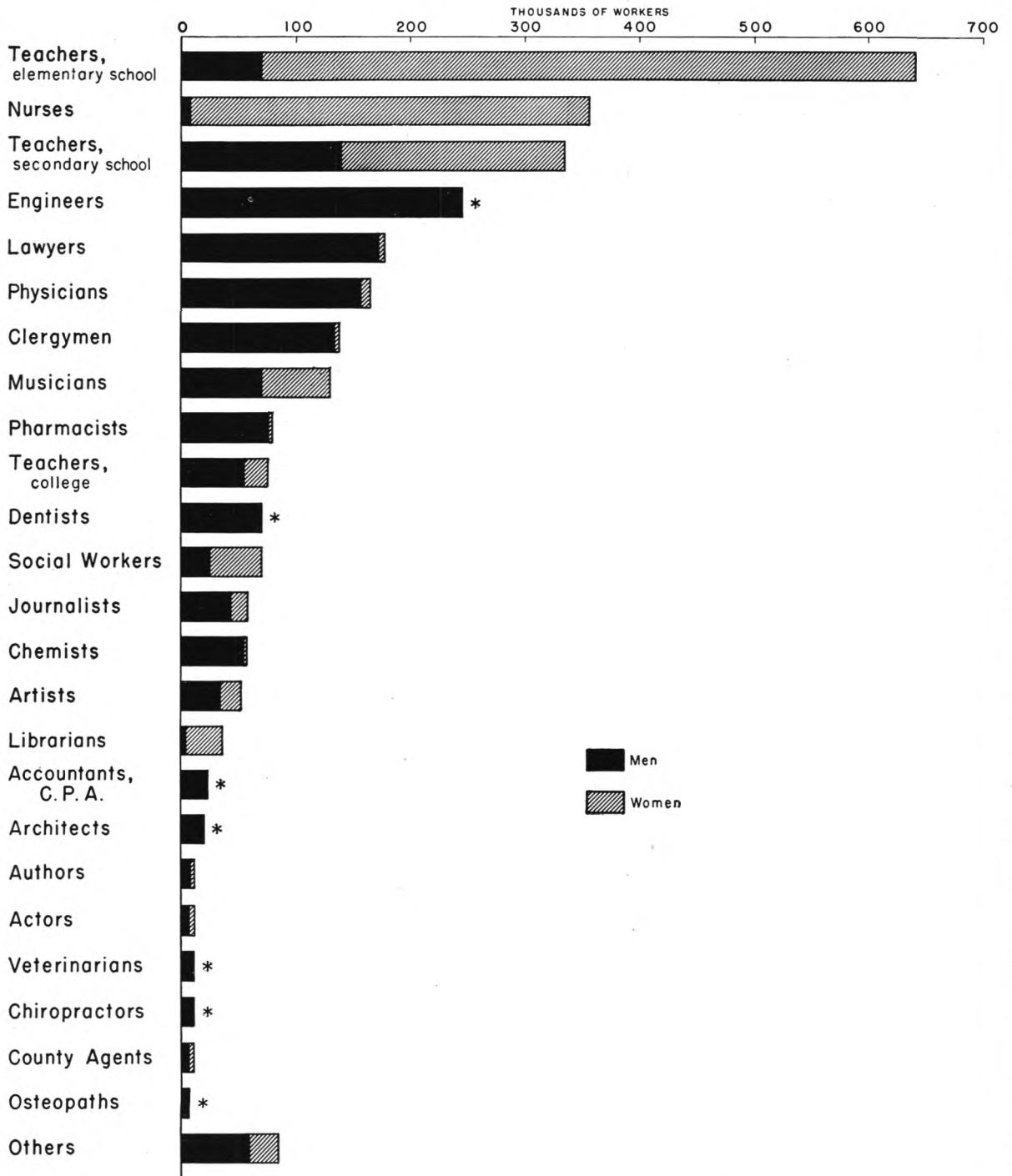


CHART 14

## MAJOR PROFESSIONAL OCCUPATIONS EMPLOYMENT 1940



UNITED STATES DEPARTMENT OF LABOR  
BUREAU OF LABOR STATISTICS

\*NUMBER OF WOMEN TOO FEW TO SHOW ON CHART  
Source: U. S. BUREAU OF THE CENSUS

# Professional, Semiprofessional, and Administrative Occupations

The three major occupation groups included in this section are related to each other in a number of ways. They are in some respects so similar that it is often difficult to determine whether a particular occupation falls in one class or the other. They all require a long period of training or experience, or both. And, although they sometimes involve manual skill—as, for example, the occupations of draftsman or surgeon—the outstanding requirement is a great deal of basic knowledge and reliable judgment. It should be remembered, of course, that the qualities just ascribed to professional, semiprofessional, and ad-

ministrative occupations are not exclusive with them; many skilled trades and clerical and sales occupations are closely related to professions or administrative occupations, and also require ability, training, experience, and a high order of knowledge and judgment.

The occupational outlook reports included in this section are grouped by fields of work representing areas of interest in vocational guidance. As soon as studies have been made of occupations in some of the other major fields of interest, such as the sciences, additional sections will be added to future editions of this publication.

## PROFESSIONAL OCCUPATIONS

What is a profession? It is easier to list them—as in the accompanying chart—than to define them. Each profession has its societies, some of which attempt to set up standards for membership in the profession. Moreover, many professions are licensed—physicians, dentists, and pharmacists for example—and in these cases the licensing board determines the qualifications that a professional person in the field should have. Very often, however, there is no clear-cut line drawn between professional and other types of workers.

### *Difficulty of Entering*

Many more young people want to get into professional fields than there is room for, even though professions as a whole are growing in size. This is partly because the professions have glamour and prestige and partly because many young people do not know enough about the many opportunities for interesting jobs and good careers in nonprofessional fields.

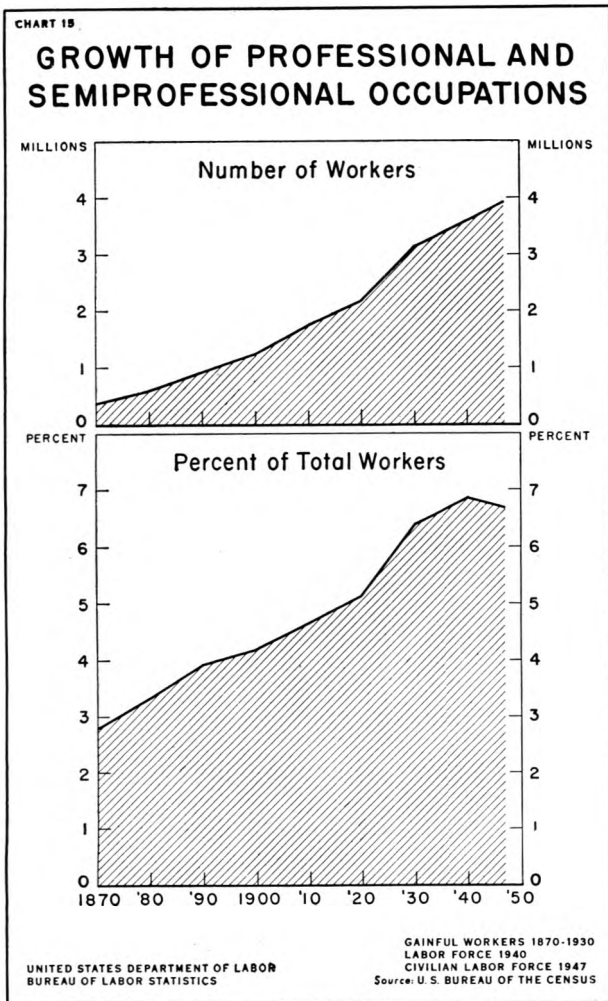
Those who want to be professional workers will

not find it easy to enter these fields. They must complete long periods of training and grinding study in competition with the very brightest students. They must take and pass difficult examinations both in the colleges and professional schools and before State licensing boards. In many cases they are not accepted for professional training unless their school grades are high; and often employers will give preference to graduates whose grades in their professional schools were in the highest half or quarter of the class.

### *Past Trends*

The professions as a group have been growing rapidly and probably will continue to grow. From less than half a million workers in 1870, the professional and semiprofessional occupations have grown to nearly 4 million today—a tenfold increase within a lifetime (chart 15). Just after the Civil War, the leading professions were the traditional ones of teaching, medicine, the ministry, and law. Three out of four professional workers

were in these occupations. Many other occupations which now have full status and recognition as professions at that time included only a few hundreds or thousands of people, many of whom had training which, by present standards, was far from adequate.



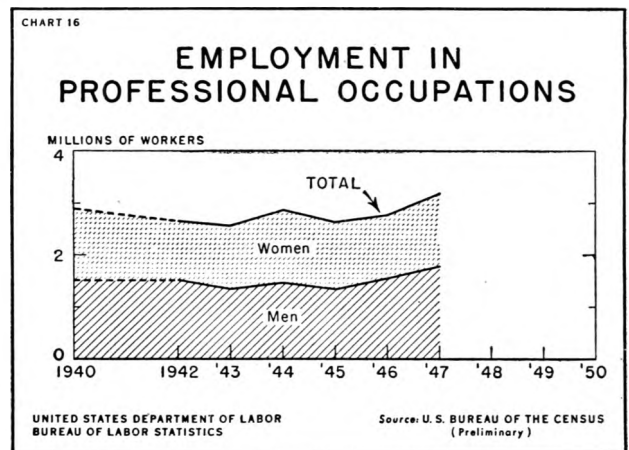
Since that time other professions have grown greatly. For example, the number of engineers, draftsmen, designers, and chemists is 50 times greater than in 1870. Of the "big four" of 1870, on the other hand, only teaching has kept pace with the growth of professions as a whole. The number practicing law has increased to about 4½ times its size in 1870, the ministry about 3½ times, and the number practicing medicine only about threefold. The number of women in the professions has grown even more rapidly than that of

men, and in April 1947, one woman in ten who worked was in this field (primarily in teaching and nursing), as compared to only one in seventeen of the men.

The growth of the professional group was fairly steady over the seven decades since 1870—somewhat more rapid in the especially prosperous decade of the twenties; somewhat slower in the thirties.

#### *Recent Developments*

During World War II we needed many more engineers, physicians, nurses, chemists, and other professional workers than ever before. The needs were greatest in the technical fields. Training programs were stepped up—medical training was accelerated, for example—but it was still not possible to train as many as were needed by the armed forces and civilian industries. The employment of professional workers in civilian jobs actually decreased during the war as many thousands were taken into the armed forces (chart 16). An increase in the number of women professional workers was not enough to offset the loss of the men. There were shortages in almost every major professional field.



As the armed forces were demobilized, the physicians, engineers, lawyers, teachers, and others returned to civilian life and civilian jobs. Employment of professional workers increased. Nevertheless, shortages continued in many fields. A peacetime economy of high employment levels demanded many more professional workers than were available. In some fields the shortages were made worse by the fact that college enrollments

had dropped during the war. Workers were drawn out of other fields such as teaching because of relatively poor pay or working conditions as compared with those offered by nonprofessional jobs which were open.

How long will these shortages last? The colleges, stimulated by the educational benefits provided for veterans, enrolled a record number of students in the fall of 1946 and broke that record again in the fall of 1947. In some fields, then, the shortage situation will be alleviated in a few years, and it may even be hard for a graduate to find a job. In others, shortages will continue. In still others, there is no shortage now. This is brought out in the reports on individual occupations.

From 1940 to 1947, despite the effect of the draft upon college enrollments, the average annual growth was slightly greater than in the previous decade; but increases in other occupations were even more rapid, and for the first time the professional fields declined slightly relative to the total of all occupations (chart 15). In view of the long-term trend and the experience of the 1920's, it seems likely that the professions will continue to increase in size in the coming decade. This conclusion is borne out by studies of the major individual professional fields.

#### *Increasing Training Requirements*

Young people interested in training for a profession should take into account a trend toward requiring more and more educational preparation for professional jobs. In one occupation after another the history of training has moved in the same direction over the years: From informal on-the-job training or apprenticeship with an ex-

perienced member of the profession to full-time institutional study (for a period of years which has grown longer and longer) followed by some form of on-the-job training.

This trend has been more pronounced in some occupations than in others; perhaps in some it will never get very far. In chemistry, for example, graduate training is necessary for a higher proportion of the jobs than is the case in engineering. A degree in business administration is still not the exclusive means of entrance into that field. Nevertheless as one examines different fields, the efforts of the professional societies to raise standards and improve the quality of training become evident.

This extension of educational requirements has resulted from the increasing complexity of each field of science, from increasing emphasis on the desirability of a broad educational background as a preparation for work as well as for life, and from the fact that so many workers do have a college education, which makes a degree necessary merely to compete for employment in many fields.

This trend was accelerated to some extent by the depression of the 1930's, which gave employers a chance to raise their hiring standards, and which at the time induced more young people to go to college, simply because jobs were not available.

It is believed that these trends will continue: That employers will require college education as a minimum qualification for more and more different occupations or, at least, will give preference to people with such education; and that an increasing amount of education will be required by employers or State boards of licensure for occupations in which college education is already considered necessary.

### SEMIPROFESSIONAL OCCUPATIONS

The line between professional and semiprofessional occupations has never been sharply drawn, and the inclusion of an occupation in one or the other group is often arbitrary. In general, the word "semiprofessional" is intended to imply that the occupation, although similar to professions in

that it demands knowledge, training, and judgment, requires a shorter or more informal period of training of a more limited nature.

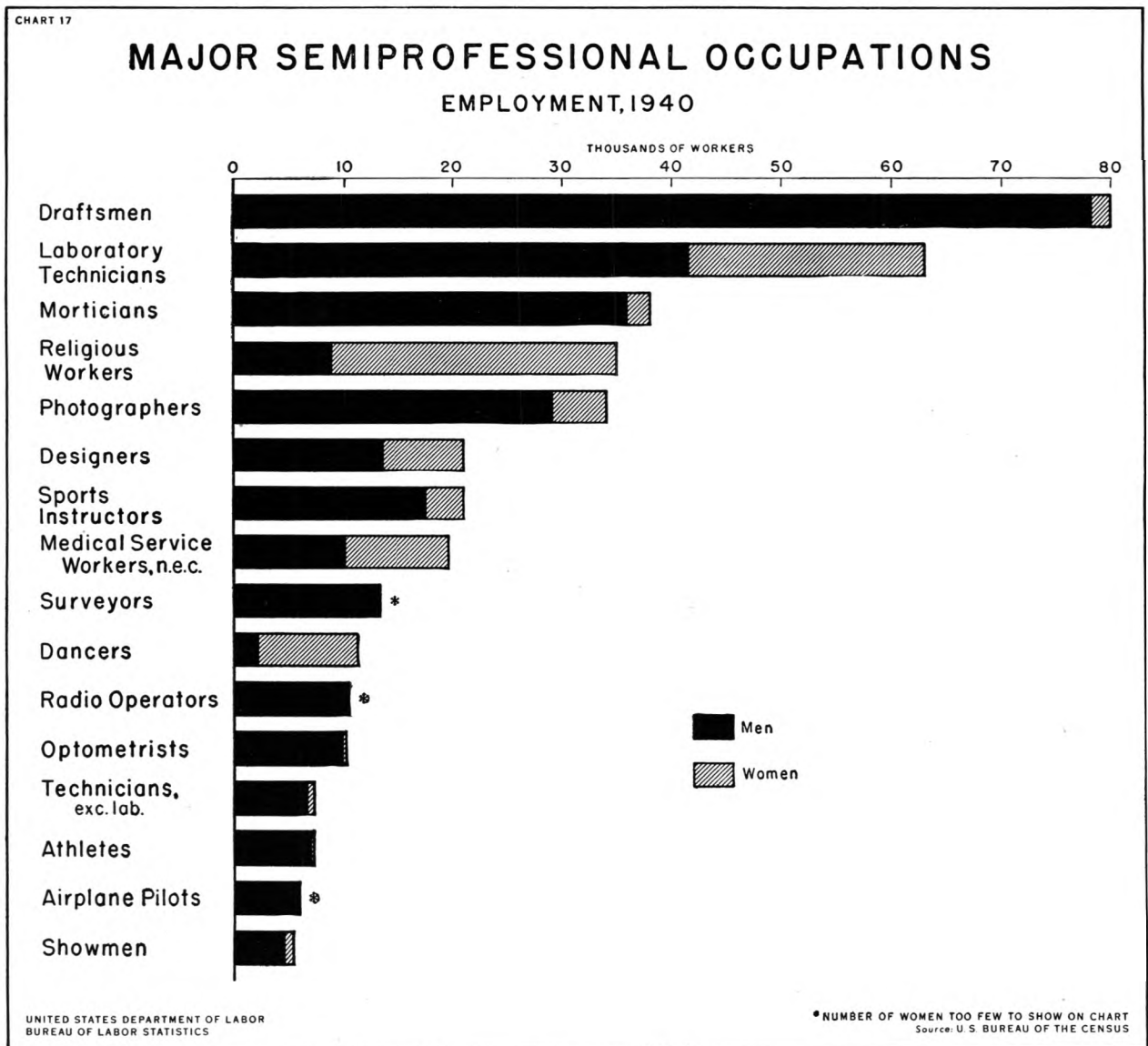
Thus, the professional engineer is given basic training in higher mathematics and scientific principles, which he applies to each new problem,

whereas the semiprofessional draftsman is required merely to have a practical knowledge of scientific methods and practices, so that he can translate the engineer's sketches into blueprints. In actual practice, the distinctions are not so pat: many a draftsman is required to know more than this implies, and, also, many draftsmen have advanced to jobs as professional engineers because of personal ability and study. On the other hand, some firms start their new graduate engineers as draftsmen so that they can learn the work from the bottom up, and many of these men do not ad-

vance beyond the draftsman's job, particularly during depressions.

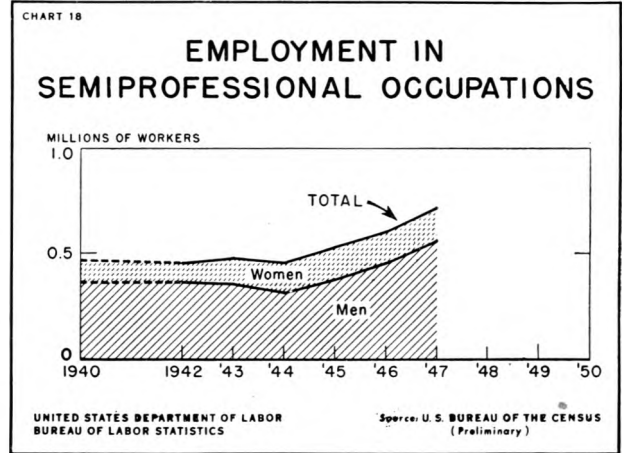
The major semiprofessional occupations are shown in chart 17. Employment in some of them—for example, airplane pilots—has increased substantially since 1940, but draftsmen and laboratory technicians are still the largest occupations in the group.

The major semiprofessional groups have grown rapidly in recent years. Scientific and technical work has been more highly organized, particularly in the laboratories and engineering depart-



ments of large firms, and more semiprofessional aids have been provided for the professional workers. During the recent war, with a shortage of engineers and chemists, it was discovered that men with less training could perform parts of the work formerly done by engineers or chemists, freeing the latter for the more difficult tasks.

The number of semiprofessional workers employed in civilian jobs did not decrease during the war, unlike the professions, and has increased sharply since the war (chart 18). Though still a small group among the major occupation fields, it has been growing rapidly, and this growth should continue.



### ADMINISTRATIVE OCCUPATIONS

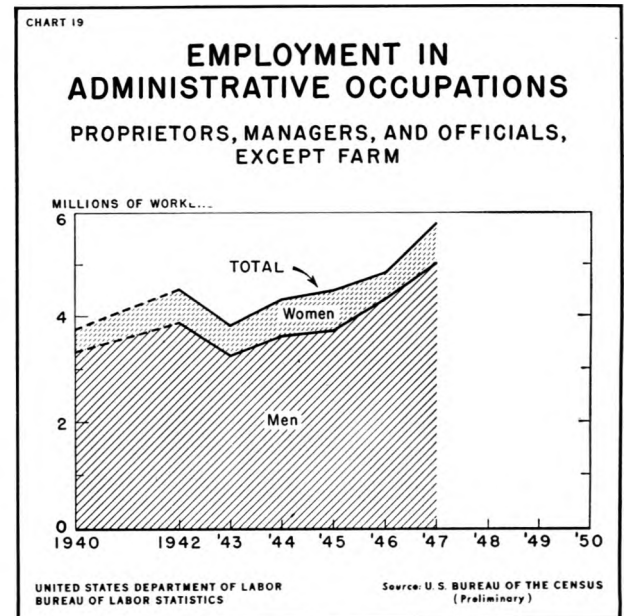
People usually reach administrative positions by promotion, and most workers in this field got their start in some other occupation such as engineer, salesman, accountant, skilled worker, or laborer. Personal ability has been more important than special training as a factor in getting an administrative job. In 1940, only 1 out of 5 administrative workers had any college training, and only 1 out of 10 had completed college.

Nevertheless, the value of formal training for this type of job is increasingly recognized. There has been a marked trend toward the extension of educational requirements for administrative jobs and toward preference for college-trained men and women. The increasing complexity of business organizations and methods has created new fields of specialization in business and public administration. Formal college-level courses have been organized in such subjects as business administration, management, public administration, personnel work, industrial relations, insurance, merchandising, traffic management, and marketing—and these have been gaining acceptance on the part of employers. It is likely that this trend will continue, particularly because so many college graduates with this type of training will be available for employment, and because business organization is likely to continue growing larger and more complex.

The census group "proprietors, managers, and officials, except farm" includes many diverse oc-

cupations: the proprietor of a peanut stand as well as the president of a large corporation. The small retail-store proprietor is the dominant occupation in the group. Of the 3,749,000 administrative workers employed in 1940, 47 percent were in retail trade, 11 percent in manufacturing, 6 percent in wholesale trade, 6 percent in government, and 5 percent in finance, insurance, and real estate. More than half the total (2,082,000) were self-employed—the majority of these being in retail trade.

Between 1910 and 1940 the number of workers



in these occupations increased by 62 percent while the total number of workers in all fields rose only 40 percent. Throughout the three decades, wholesale and retail dealers constituted about half of the total in the group. Employment fell off somewhat early in the war as many small retail stores closed their doors, but has risen steadily since 1943, and advanced rapidly since the end of the war, partly because of the opening of many small businesses. In April 1947, 5.8 million were employed in these occupations, as compared to 3.7 million in 1940—an increase greater than the average for all major

occupation groups (chart 19). The growth of this field both before and since the war suggests a long-term upward trend which may well continue.

Among the administrative occupations on which reports appear in other sections of this handbook are railroad conductors (in the section on railroad occupations), hotel managers (in the section on hotel occupations), restaurant and cafeteria managers (in the section on restaurant occupations), and filling-station managers and owners (in the section on clerical, sales, and service occupations).



# Teaching Field

Teaching is not only the largest single professional field, but it is also the parent field, in the sense that it is the teachers who educate and prepare workers for all the other professions. Teaching is also uniquely related in vocational terms to other professions and to nonprofessional occupations, since many persons who consider themselves members of a profession or a trade do part-time or full-time work as teachers. Thus, many a leading chemist, engineer, or physician is a teacher in a college or university, and in many vocational schools the crafts are taught by practicing members of the trades. Teaching, then, is one of the types of work done by members of other professions, as well as being a profession in its own right.

The great bulk of the teachers, however, particularly those in high schools, elementary schools, and kindergartens, are persons who prepared themselves primarily for the teaching profession.

The broad divisions of the field are college and university teaching, high-school teaching, and kindergarten and elementary-school teaching. The belief is widespread that the level of ability

required of the teacher increases with the age of the students; in many parts of the country both entrance requirements and salaries are greater for the high-school than for the elementary-school teacher. More recently, however, many members of the profession have come to believe that teachers of young children should be as well prepared as those who teach older children, and to attract competent teachers to elementary schools, salaries should be equalized and credit toward higher salaries given for advanced training.

By far the majority of teachers are public employees. This is true of 9 out of 10 teachers below the college level, but about half of the college teachers in 1940 were employed in private colleges and universities.

Employment in the profession has been rising rapidly in the long run, having increased nearly tenfold since 1870. This reflects the growth of population, the tendency for young people to stay in school longer, and the increasing enrichment of the curriculum, particularly at the high-school and junior high-school level.

## College and University Teachers

(D.O.T. 0-11.50)

### *Outlook Summary*

Excellent immediate opportunities for qualified persons but openings vary considerably by subject fields. Considerable increase in number of positions is expected in the long run.

### *Nature of Work*

In 1947-48, the more than 1,700 colleges and other institutions of higher education in the country had about 155,000 faculty members for 2.3 million students. Besides teaching, these faculty members frequently do research. Some devote all or part of their time to administrative work. Most have specialized in a particular subject field.

### *Where Employed*

The great majority of faculty members are in 4-year colleges, universities, and professional schools; before the war, 84 percent were employed by such institutions, about 7 percent by teachers' colleges, 8 percent by junior colleges, and 1 percent by normal schools. Largely because of differences in population, the distribution of these institutions among the States is extremely uneven. Some Western States have but one or two, with staffs totaling only a few hundred, while a few thickly populated States have over 100 colleges with more than 10,000 staff members.

*Training and Other Qualifications*

In general, a doctor's degree is required for the better college teaching positions, but requirements vary considerably according to institution and type of appointment. Instructors may be appointed directly from graduate training, especially when records are outstanding, or they may assist in teaching undergraduates while still taking advanced work. Assistant and associate professorships are usually attained only after college-teaching experience or extensive graduate training. To reach the position of professor usually requires 10 to 15 years of experience or outstanding achievement.

*Outlook*

At present there is a shortage of college-level teachers. The number of positions has increased greatly owing to unprecedented enrollments; there has been an insufficient number of new entrants from war-depleted graduate schools; and competition from better-paid fields of employment has drawn people away from teaching. From 1941 to 1945, the number of men teachers employed dropped by about 12,000. Many of these men have not returned to teaching. Shortages are, therefore, greatest in the subjects for which men are usually preferred—for example, medicine, dentistry, pharmacy, business administration, engineering, the physical sciences, and certain special and vocational subjects. Opportunities for women are particularly good in junior colleges and teacher-education institutions. However, there has been a long-term trend toward gradually increasing the proportion of woman staff members in all institutions of higher learning, though the percent is still relatively low.

While educational benefits granted to veterans have contributed greatly to present large college enrollments, it is expected that total enrollments will continue at high levels. There is a long-run trend for a larger proportion of young people to complete high school and enter college; higher

education is becoming more and more important both in meeting competition in the labor market and in social relationships. Growing interest in extending higher education, particularly at the junior-college level, is expected to result in a greater number of institutions, more widely distributed throughout the country. This will not only encourage enrollments but make it possible to have smaller classes than at present. Furthermore, the higher birth rate of the past 10 years will begin to affect college-age population in the late fifties. All these factors, plus the trend toward lengthening the period of college training, will tend to increase the number of teachers needed. The President's Commission on Higher Education recommended in 1948 that the number of faculty members be increased to 300,000 by 1960.

*Earnings*

A study of faculty salaries in 158 institutions, which are considered reasonably typical, showed the following approximate median salaries in 1947: Professors, \$4,000; associate professors, \$3,500; assistant professors, \$3,000; instructors, \$2,500. That salaries in many institutions are higher is shown by the results of another survey of faculty personnel in 29 institutions in 1947, which showed the following approximate average salaries: Professors, \$5,350; associate professors, \$4,375; assistant professors, \$3,500; instructors, \$2,850. Salaries have risen considerably in the last few years, and there may be further marked increases. In general, salaries are greatest in large universities and men's colleges; somewhat lower in women's, teachers', and junior colleges, and in denominational schools.

*Where To Go for More Information*

Federal Security Agency,  
Office of Education,  
Washington 25, D. C.

American Council on Education,  
744 Jackson Place,  
Washington 6, D. C.

## High School Teachers

(D.O.T. 0-31.01 and .10)

### *Outlook Summary*

There are immediate employment opportunities, but openings vary considerably by locality and subject field. In the long run, new entrants with only minimum qualifications will have difficulty obtaining desirable positions.

### *Nature of Work*

About 315,000 classroom teachers are employed (in 1948) in the Nation's 29,000 public secondary schools, to teach some 6 million pupils. Besides classroom instruction, most of these teachers have other duties, including supervision of extracurricular activities, record keeping and preparation of reports. Maintenance of good relations with parents, the community, and fellow teachers are other important aspects of their jobs.

Opportunities for advancement are by way of moderate salary increases within the same system, by moving to larger schools after a few years of experience, or by promotion to supervisory, administrative, or other specialized positions.

### *Training and Other Qualifications*

Typical requirements for teacher certificates are a bachelor's degree, with about a half year of professional education including student teaching. The requirements vary considerably from one State to another, however. A few States will grant certificates only to people with a year of graduate work. Many school systems, especially in large cities, require more preparation for employment than is needed for certification. The general trend is toward insisting on a master's degree or at least 5 years of college. The more desirable positions are usually filled by the highest qualified teachers. Many local school systems require previous successful experience which often must be obtained in small towns or rural schools.

Good teacher-training curricula are offered in universities with schools of education; by colleges with strong education departments and satisfactory practice teaching facilities; and by teachers'

colleges. A student who wishes to specialize in vocational agriculture, home economics, music, commercial work, or the like should choose an institution accredited for work in the specific field and should take enough hours of education and practice teaching to meet certification requirements. Although the trend is toward specialization, the greater the number of subjects a person can teach, the better are his chances for securing a position. Ability to handle extracurricular activities will also improve chances for employment.

### *Outlook*

Qualified teachers are in demand at the present time, but opportunities vary greatly by locality and subject field. In general, shortages are greatest in rural schools, in special subjects such as music, in vocational subjects such as home economics, and in the physical sciences. In most localities the need for teachers will be met most quickly in English, history, and foreign languages.

Shortages during the war were partly the result of selective-service withdrawals, since about a third of the teachers in secondary schools are men. In addition, many people left the profession for higher paying jobs in other fields. The number taking teacher education also dropped sharply. There is now a trend toward increasing salaries; this will influence qualified teachers to remain in or return to the profession and will interest more students in preparing for it. It is likely that competition for the more desirable jobs will gradually increase and that applicants will eventually outnumber openings. In this event, education and experience requirements will probably be raised, in line with the prewar trend. New entrants should plan to secure a master's degree for best employment opportunities.

Although the high school age population will decrease for the next several years, the increasing proportion attending school will probably prevent a drop in enrollment and in the need for teachers. About 1950, the rising birth rate of the past 10

years will begin to raise enrollments in the secondary school grades, and the number of high school teachers will need to be increased. In the next decade, the trend toward enriching the curriculum and offering special subjects will also tend to create employment for more teachers.

### *Earnings*

In 1946-47 high school teachers had a median salary of about \$3,600 in cities of over 100,000 population; \$2,775 in cities of 30,000 to 100,000; \$2,600 in those of 10,000 to 30,000; \$2,375 in towns of 5,000 to 10,000; and \$2,275 in those of 2,500 to 5,000. Median salaries of principals in communities of the above sizes were about \$5,750, \$4,700, \$4,075, \$3,500, and \$3,200, respectively. Median salaries of superintendents ranged from \$10,000 to \$4,225, depending on size of city.

Teachers in some special fields such as vocational education and physical education sometimes receive higher pay than classroom teachers of other

subjects. Salaries in rural schools are below those in small towns; highest salaries are usually in the largest cities. Constant increases in teachers' salaries are now taking place throughout the country.

### *Where To Go for More Information*

General information on teaching may be obtained from:

Federal Security Agency,  
Office of Education,  
Washington 25, D. C.

National Education Association,  
1201 16th St. NW.,  
Washington 6, D. C.

Information on schools and requirements in a particular State may be obtained from any department of education at the State capital.

*See also* Kindergarten and Elementary School Teachers, page 38; College and University Teachers, page 35; Physical Education Instructors, page 40.

## Kindergarten and Elementary School Teachers

(D.O.T. 0-30.02 and .11)

### *Outlook Summary*

Excellent immediate employment opportunities. Shortages of teachers for elementary grades will continue longer than at higher grade levels.

### *Nature of Work*

Kindergarten and elementary school teachers make up over half the entire teaching profession. In the school year 1947-48, about 570,000 of them were employed in public schools.

Teaching in the elementary grades usually involves working with one group of pupils during the entire day, thus covering a wide range of subjects and activities. Some schools have departmentalized instruction in the upper elementary grades, in which case teachers usually handle two or three subjects with several different groups of pupils during the school day. Teachers in rural schools may have to teach all subjects in several grades.

### *Training and Other Qualifications*

In every State except Massachusetts, a State certificate is required for teaching in public schools. The educational qualifications needed for certificates vary considerably from one State to another. Fifteen States and the District of Columbia require 4 years of college as minimum for the lowest regular certificate; 23 States require 2 or 3 years of college training; other States have even lower minimum requirements. During and since the war, many thousand emergency certificates were issued to persons unable to meet regular qualification requirements. Since the general trend is toward raising requirements, all prospective teachers should plan to secure the bachelor's degree.

There are about 1,200 institutions approved by different State departments of education from which graduates are granted State certificates without examination. However, some local districts have their own standards and examinations, in addition to the State requirements. Prerequi-

site for training is usually graduation from an accredited high school. Most States have a minimum age of 18 years, but appointing officials usually prefer somewhat older teachers. Some school systems do not employ married women; over half the States make proof of good health a prerequisite; some have citizenship and other special standards. A prospective teacher should acquaint himself with the specific requirements in the State in which he plans to teach.

### *Outlook*

There is a serious shortage of teachers at the present time. Generally, throughout the Nation, shortages are greatest in kindergartens and other primary grades in the cities and in rural elementary schools. The extent of the shortage varies considerably from one State to another and also within States; but it tends to be most acute in areas where teachers' salaries are lowest or where there are better-paying employment opportunities.

There are always many openings for new entrants due to the high rate of turn-over (prewar rate was about 10 percent), caused for the most part by young women leaving their jobs for marriage. Replacements are needed for teachers holding emergency certificates; the great majority of the 100,000 with such certificates in 1947-48 are employed in elementary schools. Kindergarten and nursery school teachers will find an increasing demand for their services. Not only is there a trend toward extending public school training to the younger groups, but the rising birth rate of the past 10 years has already increased the number of teachers needed in kindergartens and primary grades. As the greater school population moves through the system, the need for teachers in the succeeding grades will be increased, especially since each year a higher proportion of children completes elementary school and high school.

Shortages of teachers for elementary grades, especially in rural schools, are expected to continue longer than at higher grade levels. Proportionately fewer trainees are specializing in this field of teaching, where the need is greatest.

Opportunities for advancement are by way of small salary increases in the same position, shifting to larger school systems or better-paying localities,

or appointment to supervisory, administrative, or other type of specialized work. Many women hold principalships in elementary schools. Requirements were being raised before the war, and this trend can be expected to be resumed as soon as present shortages are relieved. The best opportunities will go to those having more than minimum qualifications.



Shortages of teachers are greatest in kindergarten and primary grades

### *Earnings*

In 1946-47 median salaries for elementary classroom teachers were approximately as follows: \$2,900 in cities with populations of 100,000 or more; \$2,300 in cities of 30,000 to 100,000. \$2,125 in cities of 10,000 to 30,000; \$1,950 in cities of 5,000 to 10,000; \$1,875 in towns of 2,500 to 5,000. Supervising principals in elementary schools in cities of the sizes shown above received median salaries of about \$4,325, \$3,325, \$3,025, \$2,950, and \$2,900, respectively. Rural school salaries, especially those in one-teacher schools, are considerably below those in small towns. Constant increases in salaries are now taking place throughout the country. There is a trend toward establish-

ing salary scales for elementary teachers as high as those for secondary teachers.

### *Where To Go for More Information*

General information on teaching may be obtained from:

Federal Security Agency,  
Office of Education,  
Washington 25, D. C.

National Education Association,  
1201 16th St. NW.,  
Washington 6, D. C.

Information on schools and requirements in a particular State may be obtained from any department of education at the State capital.

*See also* High School Teachers, page 37; College and University Teachers, page 35; Physical Education Instructors, page 40.

## Physical Education Instructors

(D.O.T. 0-57.21 and 41)

### *Outlook Summary*

Good opportunities at present, especially for women. In the long run, the field will probably continue to expand, but people with minimum qualifications will face increasing competition.

### *Nature of Work*

Physical education instructors give individual or group instruction in a great variety of physical activities and games, and coach teams in various sports. They also teach classes in health education, supervise school health-education programs, and direct school and community recreational activities. In small high schools, the teaching of physical education is often combined with the teaching of other subjects. In elementary schools, it is usually done by the regular classroom teacher.

### *How to Enter*

In most States, the minimum requirement for a high-school teaching certificate is a 4-year college course, including 15 to 24 semester hours in physical education and 15 to 20 hours in general professional education, including teaching methods. The employment requirements of individual schools may be somewhat higher. Courses in biological sciences, social sciences, and health education are helpful. Educational requirements for teaching in colleges or universities vary considerably, but graduate training is generally preferred. Experience in physical education with the armed forces is valuable when combined with formal education.

The usual method of entry for people without

graduate training is by way of a small school, though successful athletes sometimes start as assistant coaches in colleges or universities. Positions in colleges or large high schools usually require several years' experience or graduate training, or both. Experienced instructors may advance to physical- or health-education supervisor for a city school system or State department of education or transfer to related recreational and health activities.

### *Outlook*

At present there are good opportunities, especially for women, in this expanding field, which employs around 60,000 professional workers, according to one estimate. A severe shortage developed in the occupation during the war, since many instructors went into the armed forces or war jobs and the number of new entrants coming into the field was small. The shortage of qualified instructors is no longer acute but has not been entirely relieved; some teachers have not returned to the field, and most of those whose training was interrupted or who have entered training since the war have not yet been graduated. Moreover, the demand for instructors is expanding. The need for greater emphasis on health and physical education was dramatized by selective service rejections. As a result, more communities are planning additional physical education and recreation facilities. Some of these plans are now being put into effect, but many are being held up—chiefly because of construction difficulties. There is a greater shortage of qualified women instructors than of men; many women have left the occupation

to marry or for other reasons and there are not enough replacements.

Employment will probably continue to rise in the long run. The number of school positions is expected to increase, especially in rural areas, owing to greater State support of health and physical fitness programs, the trend toward smaller classes, the increase in school-age population, the tendency for young people to stay in school longer, and other factors which are expected to raise enrollments in high schools. There will also be increased employment in such related fields as employee-recreation programs conducted by private business or Government departments, and recreational activities and camps sponsored by churches and youth-serving agencies. Large numbers of openings will also arise owing to turn-over. This is high among women instructors; it is also considerable among men, since older men often have to transfer to other occupations.

The supply of qualified workers is expected to increase more rapidly than the demand, however. At present the proportion of prospective teachers studying physical education is much larger than usual. The number of schools offering such training has increased considerably in the past few years. Current shortages are likely to be met in the near future. As soon as the supply permits, the prewar trend toward higher requirements will no doubt be resumed, and people with inadequate training will face stiff competition. New entrants

should therefore plan to secure a year or two of graduate training. It will be advantageous to have both physical- and health-education training, since many combination jobs are opening up.

### *Earnings*

Starting salaries ranged from about \$1,600 to about \$3,300 for high school instructors without experience in 1947-48, depending on individual qualifications, size of school, geographic location, and other factors. A man with a strong background in varsity athletics nearly always receives a larger beginning salary. Directors, assistant directors, and supervisors of physical education had median salaries of about \$2,600 to \$4,600, depending on the size of the city or town. In many school systems, athletic coaches receive additional amounts above their regular salaries because of extra duties. It is often possible to supplement earnings for the school year by taking a position in a summer camp.

### *Where To Go for More Information*

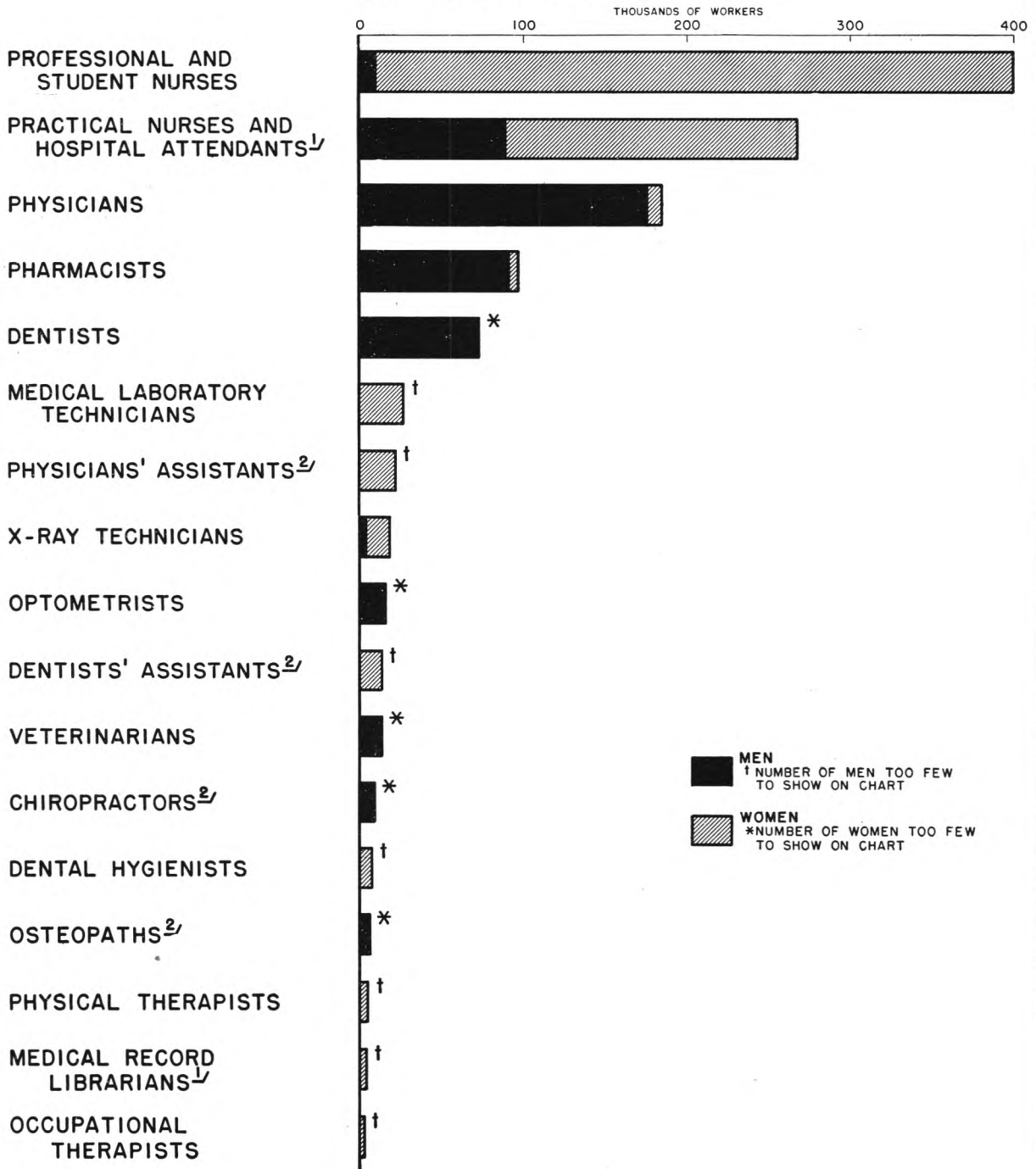
American Association for Health, Physical Education,  
and Recreation,  
1201 16th St. NW.,  
Washington 6, D. C.

Federal Security Agency,  
Office of Education,  
Washington 25, D. C.

*See also:* High School Teachers, page 37; Kindergarten and Elementary School Teachers, page 38; College and University Teachers, page 35.

CHART 20

# MAJOR MEDICAL SERVICE OCCUPATIONS EMPLOYMENT IN 1947



<sup>1/</sup> EMPLOYMENT IN 1946

<sup>2/</sup> EMPLOYMENT IN 1940

Source: U. S. WOMENS BUREAU  
U. S. BUREAU OF LABOR STATISTICS  
U. S. BUREAU OF THE CENSUS



# *Medical-Service Occupations*<sup>1</sup>

Engaging more than 1 million persons in 1940, medical and other health service is not only vital to public welfare, but important as a source of employment opportunity. With its more than half a million women workers, it ranks as a major vocational field for women. It is second only to teaching as a field of employment for professional and semiprofessional workers.

Medical services of one kind or another are given in a wide variety of workplaces, including hospitals and sanitariums, clinics, laboratories, pharmacies, nursing homes, health and hygiene agencies, industrial plants, offices of physicians, dentists, osteopaths, chiropractors, veterinarians, and chiroprudists, and in private homes. Work in these fields is to be found in every State, and in the smallest of towns—wherever there are people to be served—but of course employment opportunities are concentrated in the most populous and wealthy sections of the country.

To some, occupations in the medical services present opportunities for independent professional practice and self-employment. More than half the men in these fields are self-employed, but less than one-tenth of the women are so engaged. About one-fifth of the workers are employed by local, State, or Federal Government agencies.

The major occupations in the field are shown in chart 20. Nursing, the largest field, is also the

second largest profession for women. The occupation of physician follows engineering, teaching, and law as a major profession for men. There is close working relationship among the occupations in the medical-service field; such semiprofessional persons as dental hygienists and medical X-ray technicians are often employed directly by the dentist and the physician.

The trends in medical-service employment have been upward. The need for expansion in services is a result of an increasing population, rising income levels, better education in the need for medical care, the growth of preventive medicine, hospitalization insurance plans, progress in medical science itself, and the provision of medical care for veterans. More hospitals are being built too, and there is growing interest in plans to make medical care more available to low-income groups.

Therefore, there will be increasing employment opportunities in this large field. Moreover, because of the large number of women in some of these occupations, the replacement rate is high, and many new workers will have to be trained each year

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<sup>1</sup> This introductory section is based on *The Outlook for Women in Occupations in the Medical and Other Health Services: Trends and Their Effect Upon the Demand for Women Workers*, Bulletin 203, No. 12 (1946), published by the Women's Bureau, U. S. Department of Labor, Washington 25, D. C.

## **Physicians**

(D.O.T. 0-26.10)

### *Outlook Summary*

Excellent opportunities for those able to gain admission to medical school and complete requirements for practice.

### *Nature of Work*

Most physicians are engaged in private practice, either as individuals or in a group of doctors. Others have full-time positions on hospital staffs,

with private firms, or in governmental agencies such as the United States Public Health Service, the armed forces, and the Veterans Administration—caring for patients or giving medical examinations. Some combine private practice with a part-time position in a hospital or industry. Physicians also teach in medical schools; do research on causes of disease and development of new methods of treatment; hold administrative

positions in hospitals, clinics, laboratories, and other organizations; and write and edit medical books and magazines. A few devote their full time to these activities, but most care for patients as well.

Of the 165,000 employed physicians reported by the census in 1940, about a half were general practitioners; nearly a third were general practitioners with an interest or training in a specialty; the remainder (slightly over one-fifth) limited their practice to their specialty. The recognized specialties are, in descending order of numbers practicing: otolaryngology, internal medicine, surgery, ophthalmology, pediatrics, radiology, obstetrics and gynecology, neurology and psychiatry, pathology, urology, orthopedic surgery, dermatology and syphilology, anesthesiology, plastic surgery, neurosurgery, public health, industrial medicine, and physical medicine.

### *Training and Qualifications*

For practice as a physician in any State or the District of Columbia, one must be licensed by a State board of medical examiners and register annually with this board. With rare exceptions, it takes 7 to 9 years after high school to complete the educational and experience requirements for licensure. Candidates must be graduates of approved medical schools, which give 4-year courses and require students to have completed 3 or more years of premedical study in college. A few schools require only 2 years of premedical study, whereas others require a bachelor's degree. At all schools, this degree is an advantage in competing for admission—an important consideration in view of the present waiting list for entrance into most schools. After completing medical school, graduates generally serve at least a year's internship in a hospital; 1 year is legally required in about half of the States. Finally, they have to pass a licensing examination given by the State board of medical examiners.

To be recognized as a specialist, a doctor must meet standards established by one of the 16 specialty boards set up by the American medical profession (except for public health or industrial medicine, for which there are no specialty boards as yet). These standards include: graduation from an approved medical school, completion of an approved internship, and generally 5 years of spe-

cialized training and practice in the selected field. Residencies of varying lengths in approved institutions are required for most specialties as part of the training. In addition, physicians intending to become general practitioners often serve as residents for a year or two after completing their internship to obtain additional training and experience.



COURTESY OF U. S. PUBLIC HEALTH SERVICE  
Surgeon and assistant during a tense moment in an operating room of a hospital

### *Outlook*

The demand for physicians' services is much greater now than before the war. The rise in national income and the development of prepayment plans for medical care and hospitalization are making it possible for many more people to obtain doctors' services. Among the other factors which will tend to increase the demand for their services are the increase in population (particularly of older persons); Government provision of medical care for veterans and for members of the armed forces and their families; and the planned large-scale program for construction of hospitals in areas which have no modern facilities. Underlying these factors is the general trend toward higher standards of medical care and public health. In addition, about 4,000 new physicians are needed

each year to meet replacement needs, owing to deaths, retirements, and lowered service capacity among the many older physicians.

Acceleration of training during the war will make possible the graduation of nearly 60,000 medical students from accredited schools between 1940 and 1950, more than in any previous decade. However, the total number of physicians is not expected to increase proportionately faster than the population over the decade. It is therefore likely that with the present level of output of medical graduates, the supply of physicians will not be sufficient to meet the increased demand. However, planned expansion of medical education facilities will probably provide an additional number of physicians in the future. The outlook is excellent for young persons who can gain admission to medical school and complete the requirements for practice.

The need for physicians' services is greater in some sections of the country than in others. Even before the war, over half of all the States did not get enough new physicians to replace those who died or retired. The greatest need exists in rural areas, since physicians naturally tend to concen-

trate in and around highly populated and high-income areas.

### *Earnings*

The average physician was in the top 3 percent of the population with respect to income in 1947—with an average net income (after business expenses) of nearly \$9,900, more than twice as much as in 1939, according to a survey by *Medical Economics Magazine*. Average gross incomes over this same period also more than doubled, rising from about \$7,400 in 1939 to nearly \$17,500 in 1947. In 1947, there was a wide difference in the net income of the independent physician and the salaried physician; then the former averaged \$11,300 and the latter about \$7,900. Incomes tend to be higher in large cities than in smaller communities. It should be emphasized that earnings of individual doctors vary widely—with length of professional experience, field of specialization and personal ability, as well as size of community and region of the country.

### *Where To Get More Information*

American Medical Association,  
535 N. Dearborn St.,  
Chicago 10, Ill.

## Dentists

(D.O.T. 0-13.10)

### *Outlook Summary*

Excellent opportunities for persons able to obtain admission to dental school and complete the requirements for practice.

### *Nature of Work*

Most dentists (about 85 percent) are engaged in general practice. Only about 15 percent specialize in some particular branch of dentistry; and of this small group, only a fourth specialize on a full-time basis, the rest spending part of their time in general practice. The recognized specialties are oral surgery, orthodontics (teeth straightening), periodontics (treatment of disease), prosthodontics (making of artificial teeth or plates), pedodontics (children's dentistry),

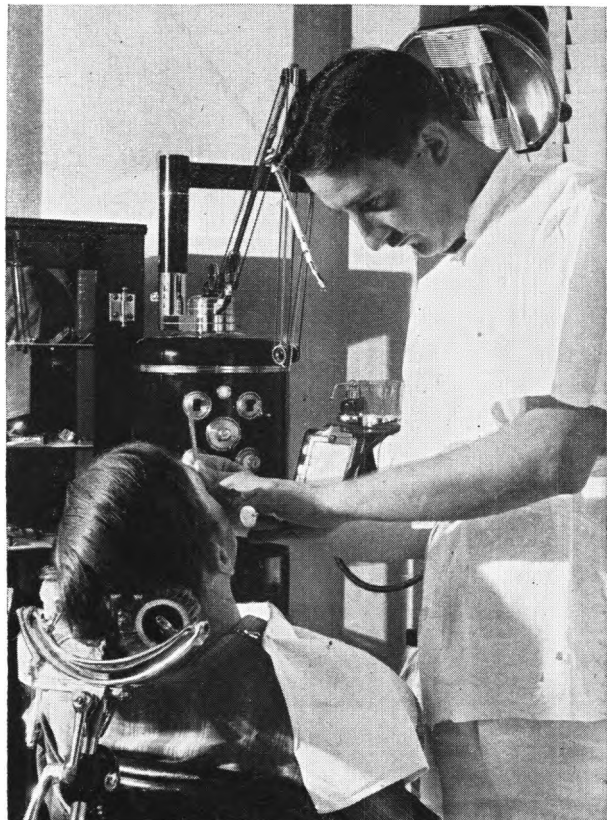
and radiodontics (taking X-ray pictures and making diagnoses from them).

The vast majority of dentists are independent practitioners. However, sizable numbers are employed by the United States Public Health Service, the Veterans Administration, the armed forces, and other Government agencies; some are assistants to other dentists; and some work for industrial plants and other private organizations.

### *Training and Qualifications*

For practice as a dentist in any State or the District of Columbia one must be licensed by the State board of dental examiners and in some States must be registered annually. The main requirement for admission to the examination for licensure is 4 years of professional dental training in

one of the 40 recognized schools of dentistry, leading to the degree of doctor of dental surgery or doctor of dental medicine. One State, Delaware, requires a year's internship before a dental graduate may be admitted to the licensing examination. At least 2 years of pre-dental study in college is required for admission to dental school.



COURTESY OF U. S. PUBLIC HEALTH SERVICE

Regular examinations by a dentist are recognized more and more as a necessity for maintenance of good health.

### *Outlook*

There is a current need for additional personnel in this profession. At the beginning of the war, there were about 70,000 employed dentists and a few hundred seeking work according to the 1940 census. The number available was not sufficient to care for the health needs of the American people. During the war, a backlog of oral defects piled up, owing to an acute shortage of civilian dentists. Wartime conditions also helped to arouse a national interest in more and better dental care. In addition, the proportion of the

population which can afford dental services has increased greatly, owing to higher income levels.

The shortage of dentists is likely to continue and may even become more acute. The number needed to replace those who die or retire each year is between 1,700 and 1,900 yearly. Annual graduations from dental schools will be several hundred higher than this, on the basis of present enrollments. But net increase in the profession indicated by these figures will not be as rapid as the anticipated growth in population. The annual output of graduates must be raised, in order to maintain even the existing ratio of dentists to population. Furthermore, there is a long-run trend toward better oral health care for the general population, particularly school children, and the Veterans Administration expects to need an increasing number of dentists for care of ex-servicemen and women. For all these reasons, the outlook for young persons having the proper qualifications and interest in the work is exceptionally bright. Dental schools, however, are at capacity now, and many have waiting lists.

All parts of the country will need dentists, but the need is less in some sections than in others. Ten States (New York, Illinois, Pennsylvania, California, Ohio, Massachusetts, New Jersey, Michigan, Minnesota, and Wisconsin) with half the Nation's population had three-fifths of all active dentists in 1940. In all States, dentists are concentrated to a great extent in and around highly populated sections, where earnings tend to be highest. Rural areas therefore have fewer dentists in relation to population than do urban ones.

### *Earnings*

In 1941, average net income was \$3,773. Independent practitioners (the great majority) averaged \$3,782; salaried dentists averaged \$3,493. By the end of the war, dentists' average income had more than doubled, owing to the increased patient load. Individual earnings vary with length of experience, type of specialization, and size of community.

### *Where To Find Out More About Dentistry*

Information on schools, requirements, practice, and earnings may be obtained from the Council on

Dental Education of the American Dental Association, 222 East Superior Street, Chicago, Ill.

This Council has published an informative

pamphlet, *Dentistry as a Professional Career*, which may be obtained from local libraries or by writing directly to the Association.

## Pharmacists

(D.O.T. 0-25.10)

### *Outlook Summary*

Very good employment prospects for several years. Possible overcrowding in some areas in long run if enrollments in pharmacy colleges continue at present high levels.

### *Nature of Work*

Pharmacy is the science of drugs. A qualified pharmacist must understand the composition, chemical properties, manufacture, and uses of drugs, and be able to test them for purity and strength. He must also be able to compound medicines as called for by physicians' prescriptions and he may advise doctors concerning the use and availability of drugs.

About 85,000 registered pharmacists were employed in the Nation's 50,000 drug stores at the end of 1946, or about 90 percent of all those in the profession. Most State laws require that, in every pharmacy, there shall be a registered pharmacist in attendance at all times. The essential function performed by the pharmacist in drug stores is filling prescriptions; particularly in small stores, however, he may perform a variety of sales and managerial duties—such as purchasing supplies and goods, arranging window displays, and hiring employees. Many retail pharmacists own and manage their own stores.

Drug manufacturing and wholesaling firms employed about 5,000 registered pharmacists at the end of 1946. Some of these men did research or supervised drug production or packaging. Others were sales representatives or detail men, who visit physicians and retail druggists to tell them about the merit of new medicinal preparations.

There were only about 2,500 registered pharmacists in the Nation's 6,282 hospitals at the end of 1946. Still smaller numbers teach in colleges of pharmacy, write for pharmaceutical publications, or are employed by State and Federal Government agencies.

### *How to Enter*

Entrance into this profession is governed by State licensing requirements. Most State laws specify that applicants for licenses must be citizens of the United States and at least 21 years of age. In every State except Vermont, graduation from a college of pharmacy is a prerequisite for obtaining a license, and most States require at least a year of practical experience under the supervision of a registered pharmacist. In a number of States, a specified amount of experience must be gained in retail pharmacy; however, most States allow full credit for hospital experience, and the number doing so may increase in the near future. All States except New York and California will grant a license without examination to a pharmacist already registered in another State, provided that at the time of original licensure he had the qualifications required by the State in which he is presently seeking a license.

### *Outlook*

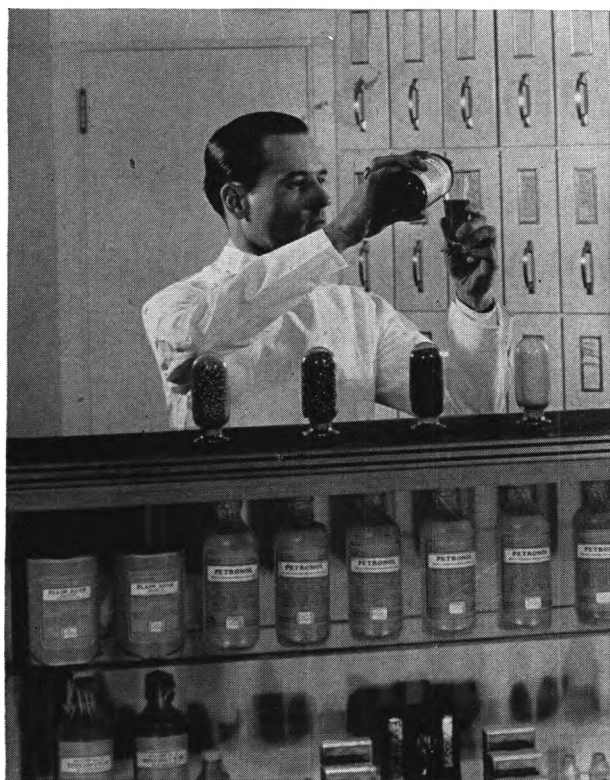
The outlook for the entire pharmaceutical profession is dominated by the prospects in retail drug stores, where a moderate upward long-term trend in employment is expected. In view of the steady increase in drug sales and the trend toward shorter working hours in the profession, it seems probable that many drug stores will have to take on additional pharmacists. It is also expected that there will be some increase—though not a large one—in the number of drug stores in the country. In recent years the tendency in cities has been away from many small stores toward fewer and bigger ones, but some new stores will be needed, particularly in new residential areas.

Employment in hospital pharmacies is expected to increase rapidly during the next few years. There will also be increased opportunities in manufacturing and wholesaling, in the armed forces and the public health services, and as teachers, law-

enforcement officials, and writers for pharmaceutical publications. In addition, around 2,500 pharmacists will be needed each year to replace those who die, retire, or transfer to other fields of work.

There is now a shortage of registered personnel in many parts of the country, because of the sharp drop in graduations during the war and the expanding employment needs. Record numbers of students have enrolled in pharmacy colleges since VJ-day (approximately 18,000 in the 65 accredited colleges in the academic year 1947-48, compared with about 8,000 in the immediate prewar years). Several new colleges have been organized and are already admitting first- and second-year students. Nevertheless, the shortage will probably not be re-

The pharmacist must exercise great care in filling a physician's prescription



lieved before the 1950's. After that, there may be a tendency toward overcrowding in some areas, particularly big cities, if enrollments continue at the present high level.

### *Earnings and Working Conditions*

Pharmacists working for others usually earned \$70 to \$80 per week during 1947, according to scattered reports from various parts of the country. Those in beginning positions with the Federal Government start at \$2,974 per year, are usually raised to \$3,727 after a year's experience, and may advance still further thereafter. Owners of successful drug stores may have considerably higher net incomes.

Hours of work are long in many drug stores, since such stores are usually open in the evenings and on Sundays. The work requires the pharmacist to be on his feet a great deal.

In drug manufacturing, teaching, publications work, and Government service hours tend to be shorter. Sales representatives spend a lot of their time going from one doctor's office or retail drug store to another and may work irregular hours.

### *Where To Go for More Information*

For general information on the profession, one may write to:

American Pharmaceutical Association,  
2215 Constitution Ave. NW.,  
Washington 7, D. C.

Information on schools and scholarships is available from the Dean of any college of pharmacy or from:

American Association of Colleges of Pharmacy,  
College Station,  
Brookings, S. Dak.

Current regulations on education, training, and other requirements for licensure in a particular State may be obtained from the board of pharmacy at the State capitol. Persons interested in entering the profession should find out about these regulations before enrolling in pharmacy colleges or arranging to obtain practical experience.

## Registered Professional Nurses <sup>2</sup>

(D.O.T. 0-33)

### *Outlook Summary*

Excellent opportunities both in the immediate future and in the long run, but openings vary considerably by locality.

### *Nature of Work*

Registered nurses (R. N.'s) are the second largest group of professional women in the country. In 1947, there were over 300,000 registered professional nurses, and over 100,000 student nurses. According to an estimate in 1946, about 60 percent of the employed nurses were in hospitals, schools of nursing, or other institutions; about one-fourth were in private practice; the remainder were public health, industrial, or office nurses. In 1940 only 2 percent were men; only 2 percent were Negroes.

### *Training and Other Qualifications*

To be a registered nurse, one must have a license issued by the State board of nurse examiners or other authorized agency. In practically all States, applicants for licenses must have high school diplomas and be graduates of schools of nursing approved by the State board. The basic course in nursing education usually consists of 3 years of combined study and supervised experience in one or more hospitals. Most States specify that applicants must be at least 21 years old, and all require them to pass an examination given by the board. Provision is made by most States for granting of licenses or certificates without examination to registered nurses from other States.

Educational preparation beyond the minimum required for licensing is an asset in competing for professional advancement. Almost 200 schools offer college-level nursing programs leading to a degree. Nurses with the United States Public Health Service must have had at least a year of postgraduate study in public-health nursing at a college or university approved by the National Organization for Public Health Nursing.

The opportunity for women to advance to posts of responsibility is good, because of the large number of supervisory positions in this large profession and the lack of competition from men. Teaching and administrative positions, particularly in schools of nursing, usually go to those who have college degrees as well as the necessary professional preparation and who combine successful experience with aptitude for teaching or administrative work. Advancement is also possible through specialization in such fields as anesthesia, midwifery, industrial hygiene, and orthopedic, pediatric, maternity, or psychiatric nursing, where the demand for nurses is expanding and pay tends to be higher. Public health nursing also offers many opportunities for advancement.

### *Outlook*

The present shortage of nurses, estimated to be somewhere between 40,000 and 60,000 is caused by an unprecedented demand for nursing service at a time when many nurses are leaving the field and insufficient numbers are entering nursing schools. Although the supply increased rapidly during the war, owing to Cadet Nurse Corps training, new enrollments decreased greatly after VJ-day, but were higher in 1947 than in 1946. At the same time, more nurses than usual have been dropping out because of marriage and family responsibilities, retirement, desire for additional training, or transfer to other lines of work. The need for nurses continues to increase. Civilian hospitals have larger patient loads. Meanwhile, the postwar drop in the number of volunteers who helped care for patients during the war has been very great. More private duty nurses are needed to take care of people who still cannot be accommodated in hospitals. Additional public-health nurses are also needed. Because of the tendency of nurses to concentrate in large cities, the greatest shortages are in small towns and rural areas.

In the long run, the shortage of nurses is expected to continue; it may become even more acute.

<sup>2</sup> Prepared by the Bureau of Labor Statistics in cooperation with the Women's Bureau.

The trend toward greater use of nursing service, which has been evident for the past quarter century, has been accelerated by recent developments. The Federal Government has become more active in meeting health needs. Recently enacted bills and pending legislation will mean employment for many thousands of nurses. Veterans' hospitals will have increasing numbers of patients, with the peak expected about 1975. Hospital insurance

hand, a fourth earned more than \$195. Median earnings in different fields of nursing ranged from \$153 a month for private duty work to \$207 for nurse educators. Because of differences in the number of days worked during the month, earnings of individual private-duty nurses varied widely; one out of four earned less than \$95 and another fourth received at least \$200. There was also variation by regions, from a median of \$144 in New England to \$202 in the Pacific States. An 8-hour day and a workweek of 40 to 48 hours has become the generally accepted schedule in nursing, but there are many deviations, especially in private-duty nursing.

#### *Where To Go for More Information*

Additional information on the outlook for women as professional nurses is given in the following publication:

U. S. Department of Labor, Women's Bureau—*Professional Nurses*. Bulletin 203, No. 3. 66 pp. Washington, 1946. Price 15 cents.

Additional information on earnings and working conditions is given in the following publication:

U. S. Department of Labor, Bureau of Labor Statistics. *Economic Status of Registered Professional Nurses*. Bulletin No. 931. 69 pp. Superintendent of Documents, Washington 25, D. C. (1947). Price 30 cents.

Information may also be obtained from:

American Nurses' Association,  
1790 Broadway,  
New York 19, N. Y.

National Committee on Careers in Nursing,  
11th Floor,  
1790 Broadway,  
New York 19, N. Y.

National League of Nursing Education,  
1790 Broadway,  
New York 19, N. Y.

National Nursing Council,  
1790 Broadway,  
New York 19, N. Y.

Information on State registration requirements may be obtained from the board of nurse examiners from any State capital or from the Counselor of any State Nurses' Association (a directory of these counselors is available from the American Nurses' Association).



COURTESY OF U. S. PUBLIC HEALTH SERVICE

During an operation the surgical nurse is depended upon for her alertness and coordination in assisting the surgeon

plans are enlarging hospital patient loads. The field of public-health nursing is growing. The general growth in population, with a larger proportion of older persons, will also increase the need for nursing service. Turn-over will continue to create many job openings each year. It is estimated that about 500,000 nurses will be required by 1960 to maintain current standards of nursing.

#### *Earnings and Hours of Work*

In October 1946, median monthly earnings of registered nurses who were not provided with living quarters were between \$170 and \$175. About one in four earned less than \$145; on the other



## Veterinarians

(D.O.T. 0-34.10)

### *Outlook Summary*

Very good opportunities in immediate future. In the long run the greatly increasing number of new entrants may cause some overcrowding.

### *Nature of Work*

Veterinarians study and treat diseases of animals, serve as counsel on matters relating to the care and breeding of animals, and inspect animal products intended for human consumption.

Most of the 14,000 veterinarians in the United States are general practitioners; among those who specialize, the majority work with cattle or small animals. About 65 percent are in private practice; most of the remainder are employed on a salary basis by Federal and State agencies for meat inspection, disease control, and research. About 400 are now in the Army Veterinary Corps, in which 2,200 served during the war. Some are employed as teachers, and a few work for commercial manufacturers of products used in veterinary medicine.

### *Where Employed*

Veterinarians are found chiefly in States where a large percentage of the Nation's livestock is raised. States in which veterinary service is now in use on a large scale are New York, Illinois, Iowa, California, Ohio, Pennsylvania, Indiana, Michigan, Minnesota, Wisconsin, Texas, Missouri, and Kansas. Most of the private practice, except pet practice, is in rural areas.

### *Training and Other Qualifications*

A license is required to practice in all States and the District of Columbia. Generally, applicants must be graduates of veterinary schools and must pass an examination to obtain a license. A few States accept diplomas from approved schools in lieu of the examination; some do not specify graduation, but few except graduates could pass the required examinations. At least 1 year of pre-veterinary work and 4 years of professional study

in a veterinary college are required for the doctor of veterinary medicine degree. Further training can be taken in specialized fields such as pathology or bacteriology. There are 10 accredited schools in the United States and 7 new schools not yet eligible for recognition. Only graduates of accredited veterinary colleges are admitted to examination for Federal civil-service employment.

### *Outlook*

There is a current shortage of veterinarians for private practice work, due largely to the increased demand for their services as a result of the present high value of livestock. There are also many openings in salaried positions, particularly with the Bureau of Animal Industry of the United States Department of Agriculture, for inspectors of meat products and for work in disease eradication and control. Teachers are needed to staff the several new schools which have opened. Because there are many men in this occupation who are at or nearing the retirement age, there will be above-normal replacement needs in the years immediately ahead.

In the long run, some growth in the field is expected. Principal fields for future expansion are public-health work and research on livestock diseases, the former being concerned mainly with food inspection and control of diseases transmissible to man. Some expansion also is expected in opportunities in private practice. The trend is toward more scientific attention to the raising of livestock and poultry—to produce more and better meat, milk, wool, and other products with the same amount of feed and care. However, in this field the demand for veterinary service depends largely upon economic conditions, as the market value of an animal usually determines the professional care that can be afforded. Practice with pet animals has grown greatly in recent years and can be expected to make further gains.

The increased need for replacements together with greater demand for veterinary services in

numerous fields will create job opportunities above the normal rate for a number of years. However, this is a small profession and the number of new entrants that can be accommodated is limited. Beginning in 1949, graduating classes will exceed prewar figures. New schools now being established will make possible an even larger number of graduates. In the long run, it may become more and more difficult for new entrants to find desirable locations for establishing independent practices, and the competition for salaried jobs will increase.

### *Earnings*

Income from private practice varies greatly according to location and length of time in practice, with the range being about \$2,500 to \$10,000 or higher. Only a small percentage have a net in-

come of over \$5,000 a year. However, most practitioners live in rural areas where living costs are comparatively low. The two fields which usually bring highest incomes are pet practice in metropolitan areas and specialized practice with thoroughbred horses and other purebred animals, such as fine dairy cattle. Veterinarians employed by the Federal Government earn \$2,974 to \$4,479 in most types of jobs; salaries of veterinarians employed by State and municipal governments are generally lower.

### *Where To Go for More Information*

American Veterinary Medical Association,  
600 S. Michigan Ave.,  
Chicago 5, Ill.

United States Department of Agriculture,  
Bureau of Animal Industry,  
Washington 25, D. C.

## Medical Laboratory Technicians<sup>3</sup>

(D.O.T. 0-50.01)

### *Outlook Summary*

Expanding demand and good employment opportunity for graduates from approved schools and for all-round experienced workers with college background. High-school graduates with laboratory experience as helpers or routine workers will not have much chance in competition with well-trained personnel.

### *Nature of Work*

About two-thirds of all medical laboratory technicians are employed in hospital laboratories, where they make blood and urine analyses on all patients and, as directed by a physician, special analyses and laboratory tests (metabolism, sputum, serology) on particular patients. Others work in physicians' laboratories, in public-health laboratories, in clinics, and in medical schools.

### *Training and Other Qualifications*

One may qualify for registration with the Registry of Medical Technologists of the American Society of Clinical Pathologists by graduating from one of the 294 hospital schools for clinical

laboratory technicians approved by the American Medical Association. The length of the course at an approved school ranges upward from the required minimum of 12 months. For entrance, 2 years of accredited college work, which may be raised to 3 years in the near future, are required. Certain credits in specified subjects, or graduation from a recognized school of nursing plus 30 semester hours of college work including chemistry and biology, are required. Painstaking accuracy, dependability, and ability to follow directions are some of the most important personal traits for advancement. The advancement opportunity for even thoroughly trained medical technicians also depends on the size of the organization.

### *Outlook*

The demand for registered technologists and for adequately trained technicians will continue to increase with the extension of hospitals for veterans and for the civilian population, and of public-health services and clinics. With the spread of hospitalization insurance, the number of patients served in hospitals will continue to rise. Laboratories in public-health facilities are also gradually increasing in number.

<sup>3</sup> Prepared by the Women's Bureau, U. S. Department of Labor.

Many practicing physicians are forming small groups, hiring a medical laboratory technician, and maintaining a laboratory to service the group. Most specialists in internal medicine employ a full-time technician because of the large number of routine and special laboratory tests involved in the diagnosis and treatment of diseases of the internal organs. Industrial medical laboratories are also growing in number with the emphasis on industrial hygiene. The growing use of powerful drugs such as the sulfa group, requiring laboratory checking, also tends to increase the need for the laboratory technician. Opportunities in research are usually limited to those who have degrees in science or medicine. Poorly or partially trained technicians who entered the field because of wartime emergency will have difficulty in competing with well-trained personnel because of high peacetime standards of skill and competence.

In 1947 there were approximately 13,000 registered medical technologists and another group of about 12,000 to 13,000 without approved training who were working as technicians in medical laboratories. According to the American Society of Medical Technologists, from 1,000 to 2,000 newly trained medical technologists should be available yearly to keep abreast of the demand for the next 15 years. About 1,000 were graduated in 1946 from approved schools. It is estimated that 45,000 will be needed by 1960. During the war approved hospitals employed nonregistered technicians, many of whom had been trained for only a few weeks or months in schools that offered substand-

ard courses. But poorly trained persons cannot obtain jobs when well-trained persons are available. The vast majority of medical technicians are women. Some of the men who had received laboratory training in the Army and Navy, however, may find opportunity as laboratory workers by acquiring additional skills required by peacetime standards established in the profession.

### *Earnings*

In 1946, a study of 1,153 technologists showed that 1 percent received less than \$1,200 and 4 percent received more than \$3,600, in both cases without maintenance. The largest group of medical technologists were paid from \$2,400 to \$2,700 without maintenance. Medical laboratory technicians in hospital laboratories usually receive higher salaries than those in university laboratories and in physicians' offices; but their salaries are lower than those in public-health laboratories and commercial clinical laboratories.

### *Where To Go for More Information*

Additional information on the outlook for women as medical laboratory technicians is given in the following publication:

U. S. Department of Labor, Women's Bureau—*Medical Laboratory Technicians*. Bulletin 203, No. 4. 10 pp. Washington, 1945.

Information may also be obtained from:

American Society of Medical Technologists,  
Medical Center Bldg.,  
Lafayette, La.

## Optometrists

(D.O.T. 0-53.10)

### *Outlook Summary*

Good opportunities at present and in immediate future. Some expansion in field expected in long run, but increasing number of new entrants will create considerable competition for desirable locations.

### *Nature of Work*

Optometrists specialize in examining the eyes and conserving and improving the vision. They administer a series of tests to determine visual effi-

ciency and prescribe lenses or corrective exercises when needed. They do not treat diseases of the eye but refer patients to doctors of medicine for such care. Some optometrists fill the prescriptions for eyeglasses in their own laboratories.

Optometrists use various instruments for eye measurement and examination. The ophthalmometer or keratometer may be used to measure the degree of astigmatism; the retinoscope and refractometer, to determine the degree of near-sightedness or far-sightedness; the ophthalmo-

scope, to examine the interior of the eye. Optometrists also give subjective examinations, using a series of lenses and prisms to assist in determining the one or combination which gives the patient greatest clearness, comfort, and efficiency of vision.

Optometrists should not be confused with oculists or opticians. The oculist (or ophthalmologist) is a duly licensed doctor of medicine who is a specialist in the medical and surgical care of the eyes and is qualified to prescribe lenses or any other form of treatment. The optician fills prescriptions for eyeglasses written by oculists or optometrists; he does not examine eyes nor prescribe treatment.

#### *Where Employed*

Most optometrists are engaged in private practice and maintain offices in professional buildings or in their homes. Many, especially new entrants, are employed by established practitioners or are associated with clinics or industrial organizations.

The greatest number of optometrists are in urban areas. The ratio of practitioners to population varies greatly from one State to another. For example, California, Oregon, and Illinois have 1 optometrist for about every 5,000 persons, while in some Southern States the ratio is 1 to every 20,000 persons.

#### *Training and Other Qualifications*

A license is required in all States and the District of Columbia for the practice of optometry. Graduation from a 4- or 5-year course in a college of optometry which has been approved by the American Optometric Association is necessary for admittance to a State board examination. The 10 accredited schools and colleges of optometry, all of which require high-school graduation for admittance, award the degree of doctor of optometry or the degree of bachelor of science in optometry. Young people planning to enter such colleges should take as many classes as possible in mathematics and science.

#### *Outlook*

Optometrists who are already trained or who enter practice in the near future will find good opportunities. There is room for new entrants to replace those lost because of death and retirement and to make up for curtailment of training during

the war. At present, there are only about 17,000 registered optometrists and only a relatively small number of physicians who are specialists in eye health, to take care of the visual requirements of the entire population.

In the long run, there will be an increasing number of employment opportunities, owing to population increase and the extension of eye care. There is a growing awareness of the need for such care, brought about largely by school health examinations, expansion of health facilities in rural communities, emphasis on safety through proper vision, and the importance of vision in modern industry. However, the present number of students of optometry is three times the prewar number. If such increased enrollments continue for several years, it may become difficult for new entrants to find desirable opportunities for practice.

The need for practitioners is greatest in rural communities and small towns. Those choosing a location should take into consideration the fact that the demand for optometric services depends not only on the number of people in the locality and their income level but also on the occupations in which they are employed. For example, the proportion of people using eyeglasses is less among farmers than office and factory workers.

#### *Earnings*

Self-employed optometrists had the following approximate median net incomes in 1944 according to a survey of members of the American Optometric Association: \$1,720 for the first year of practice; \$2,825 for the third year; \$3,675 for the fifth year; \$4,970 for the tenth year. The median net incomes of optometrists with the same amount of experience who were working for others were approximately \$1,900, \$2,510, \$2,940, and \$3,410 respectively. In general, incomes were highest in cities with populations of from 10,000 to 50,000.

#### *Where To Go for Further Information*

General information on optometry may be obtained from:

American Optometric Association,  
518 Wilmac Bldg.,  
Minneapolis 2, Minn.

Information on State requirements for licensing optometrists is available from the State board of examiners in optometry in any State capital.

## Chiropractors

(D.O.T. 0-42.10)

### *Outlook Summary*

Employment opportunities vary widely from one part of the country to another. New entrants with the highest qualifications will have greatest opportunities.

### *Nature of Work*

Chiropractic is a system of treatment based on the premise that the nerve system controls the physiological functions of the human body, and that interference with the nerve system impairs normal functions and induces disease by rendering the body less resistant to infection or other causes of disability. The chiropractor treats by specific adjustment and manipulation the structures of the body, especially those of the spinal column. He makes use of such supplementary measures as diet, rest, light, water, heat, and exercise. Most practitioners enter independent private practice which is limited almost entirely to office calls.

### *How To Enter*

High school graduation or its equivalent is prerequisite for training in all States issuing licenses, and one or more years of preparatory college work is required in some States. With the exception of a few States, 4 years of training in 1 of the 26 chiropractic colleges is necessary for admission to examinations; the degree of D. C. (doctor of chiropractic) is awarded upon completion of this course. The make-up of the examining boards differs among the States; some are composed of medical members only, chiropractic members only, or basic science members only, while other boards have combinations of these. As a result, examinations given by some boards are considered much more difficult than those given by others.

Chiropractic is licensed in 43 States, Hawaii, Alaska, and the District of Columbia, but is not

legalized in Louisiana, Massachusetts, Mississippi, New York, and Texas.

### *Outlook*

The success of the new entrant will depend in large part on proper selection of a location; since the principles of healing by chiropractic are not as yet universally accepted, community attitudes and State regulations vary widely.

Employment opportunities will be greatest for new entrants who are able to meet the highest State licensing requirements, including graduation from a 4-year course of 3,600 or more hours. It will become increasingly important to be able to qualify for any State examination in order to have a wide choice of locations.

Opportunities for women appear to be good, as many women prefer to go to members of their own sex for treatment. In 1940, 18 percent of the 11,000 chiropractors reported in the census were women.

There are some opportunities for chiropractors as teachers and in X-ray work (taking and interpreting X-ray pictures for other chiropractors).

### *Earnings*

As in other types of independent practice, income of chiropractors varies according to such factors as ability, personality, length of experience, location, and economic conditions. Average net income before the depression was about \$2,500. A survey made just before the war showed that average net income ranged from about \$1,500 in the first year of practice to a peak of \$7,500 after 10 to 15 years of practice. Incomes are known to have risen considerably in the last few years.

### *Where To Find Out More About Chiropractic*

National Chiropractic Association,  
National Bldg.,  
Webster City, Iowa.

## Medical X-Ray Technicians <sup>4</sup>

(D.O.T. 0-50.04)

### *Outlook Summary*

Good employment opportunities for registered technicians or those with comparable training and experience. Limited opportunities for those who have received only short, specialized training in the armed services.

### *Nature of Work*

The medical X-ray technician operates X-ray equipment for the purpose of photographing parts of the body or treating patients by means of X-rays. He usually works under the direction of a physician. His job may include various related duties such as developing and drying the films, or office work of an unrelated nature. X-ray technicians employed in industry for the examination of materials are not included in this discussion.

### *Training and Other Qualifications*

X-ray technicians are trained principally in approved training courses at various hospitals. In general, high school graduation is required for entrance to a 12-month course of training. Preference is given to graduate nurses, those with some training in nursing, and those with college work in science. In order to become registered by the American Registry of X-ray Technicians, it is necessary to have completed high school or the equivalent, to have at least 2 years of experience and training under a recognized radiologist, and to pass an examination given by the board of trustees. There were about 6,000 registered X-ray technicians in 1947.

Good health is an important consideration in this occupation, since those who work with X-rays and radium are subject to the effects of radiation which may make them anemic.

About half of all medical X-ray technicians are employed in hospitals; some work in the offices of radiologists and of dentists or in laboratories which serve physicians, dentists, and others using

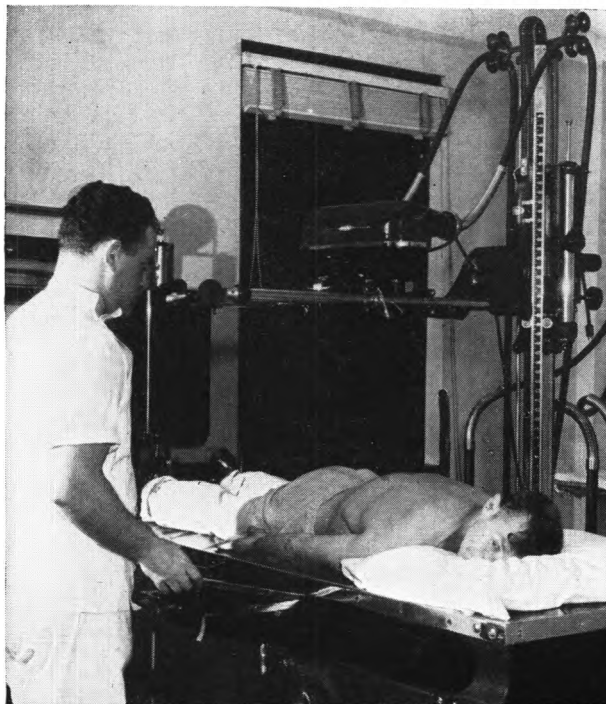
X-rays for medical purposes. The technician may specialize in X-rays of certain parts of the body, such as the chest, abdomen, or feet.

### *Outlook*

The general trend in the medical services is toward an increasing need for X-ray technicians. The total number of X-ray technicians in 1947 was estimated at 19,000 as compared to about 15,000 before the war. About 78 percent were women but the number of male technicians was increasing. Hospitals graduate from 500 to 700 X-ray technicians each year. Many others are trained informally by the radiologists for whom they are working. Since X-ray work is still incidental in many medical services, there is often a preference for persons who have related training or experience

X-ray technician taking X-ray film in a hospital

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<sup>4</sup> Prepared by the Women's Bureau, U. S. Department of Labor.

in nursing, in medical laboratory work, or in secretarial work.

Originally used for diagnosis in bone work and in the location of foreign bodies, the X-ray is now employed widely in such fields as examination for detecting tuberculosis, and defects of the teeth and in the treatment of cancers, tumors, sinusitis, and certain skin conditions. Industrial establishments, health departments, tuberculosis hospitals and associations in many parts of the country are organizing for the routine X-raying of large groups. Many insurance companies are beginning to include a chest X-ray as a part of the physical examination. Expansion in the use of X-ray should create ample opportunities for those who will be graduated from approved schools. But those who received only partial training in the armed services may have difficulty in qualifying for positions in civilian medical services. It is estimated that 35,000 medical X-ray technicians will be needed by 1960 to fill anticipated needs.

### *Earnings*

Annual earnings of X-ray technicians ranged from \$1,800 to \$3,600 in 1947. Civil-Service salaries for X-ray technicians begin at \$2,498. Opportunities for advancement are relatively few but there are some supervisory jobs in large hospitals, institutions, laboratories, or public health agencies where a number of technicians are employed.

### *Where To Go For More Information*

Additional information on the outlook for women as medical X-ray technicians is given in the following publication:

U. S. Department of Labor, Women's Bureau—X-Ray Technicians. Bulletin 203, No. 8. 14 pp. Washington, 1945. Price 10 cents.

Information may also be obtained from:

The American Registry of X-Ray Technicians,  
Alfred B. Greene, B. Sc. R. T.  
2900 E. Minnehaha Parkway,  
Minneapolis 6, Minn.

## Occupational Therapists<sup>5</sup>

(D.O.T. 0-32.04)

### *Outlook Summary*

Good employment opportunities for persons already trained and for a steady flow of new entrants.

### *Nature of Work*

The occupational therapist conducts programs for patients in hospitals and other institutions to provide them with directed activity which will help in their rehabilitation; he supervises workers who teach such activities as arts and crafts. Occupational therapy is a type of treatment prescribed by a physician to hasten a patient's recovery from disease or injury or to help him adjust to hospitalization. Among the activities taught are: weaving, leatherwork, woodwork, photography, metalwork, ceramics, plastics, printing, and gardening.

Most occupational therapists work with mental or orthopedic patients; many are employed in tuberculosis or children's hospitals or wards; still others specialize in work with the blind or with

patients who are chronically ill. Almost all the work done in the past has been in hospitals and institutions, but recently there has been a trend toward the development of community workshops to which those who need occupational therapy may come from their homes or places of employment. At present the largest field is in the rehabilitation of veterans. Most of the tuberculosis and neuropsychiatric veterans' hospitals, as well as some of the general veterans' hospitals caring for large numbers of chronic patients, have occupational therapy departments.

### *Training and Other Qualifications*

Graduation from an accredited school of occupational therapy is generally required to qualify as an occupational therapist. There are 26 such schools in the United States, 4 of which have not been in existence long enough to obtain accreditation. Requirements for entrance vary with the course subsequently taken. A 5-year degree or a 4-year diploma course is available to high-school

<sup>5</sup> Prepared by the Women's Bureau, U. S. Department of Labor.

graduates. A 3-year diploma course is offered persons with 1 year of college, and advanced standing is given for additional college work. Preference is given to students interested in degree courses; enrollments in the diploma courses are decreasing and these courses may ultimately be dropped. To become a registered occupational therapist, it is necessary to graduate from an accredited school and to pass the national registration examination given by the American Occupational Therapy Association.

### *Outlook*

There is an increasing need for capable persons in this small, but growing field. The American Occupational Therapy Association believes that a minimum total of 5,000 will be needed in this occupation by 1960. At present there are shortages especially of those qualified for administrative jobs. There will continue to be good opportunities for new entrants because of expansion of veterans' hospitals, civilian health programs, and the increasing use of occupational therapy for mental patients, crippled children, tuberculous patients, and convalescents. There is likely to be considerable turn-over because of the retirement of the many young women in the occupation who marry.

There were approximately 3,000 persons, mostly women, in the occupation in 1947, of whom about 2,500 were registered. In spite of the special war-training programs, the need is so great that no oversupply in this field is anticipated in the pre-

dictable future; however, at a later date the partially trained wartime assistant and junior aide may find difficulty in competing with the more completely trained person.

The greatest number of occupational therapists were formerly along the eastern seaboard and in the Midwest; however, future employment opportunities may tend to be more widespread, because veterans' hospitals, where so many will be employed, are located in many States.

### *Earnings*

Salaries for beginners range from \$1,500 to \$2,000. In institutional work, \$75 to \$100 per month, plus maintenance, is the usual salary. Heads of departments or of schools may earn as high as \$3,500 to \$5,000 a year, the average falling between \$2,500 and \$3,500. Federal civil service pays \$2,974.80 per annum for qualified entrants as occupational therapists.

### *Where To Go for More Information*

Additional information on the outlook for women as occupational therapists is given in the following publication:

U. S. Department of Labor, Women's Bureau—Occupational Therapists. Bulletin 203, No. 2. 15 pp. Washington, 1945. Price 10 cents.

Information may also be obtained from:

American Occupational Therapy Association,  
33 W. 42d St.,  
New York 18, N. Y.

## Physical Therapists<sup>6</sup>

(D.O.T. 0-52.22)

### *Outlook Summary*

Excellent opportunities for persons already qualified. New entrants from approved schools should readily be absorbed for several years to come.

### *Nature of Work*

The physical therapist administers treatment only as prescribed by a physician. Physical

therapy includes treatment by means of massage, exercise, heat, light, water, and electricity, for poliomyelitis, arthritis, cerebral palsy, and for neuropsychiatric and other patients.

Most physical therapists work in hospitals, but some are employed by orthopedic surgeons, by physiatrists (physicians specializing in physical medicine) or in public health or social service agencies serving crippled children, injured industrial workers, and others who need physical therapy treatments. Those employed in hospitals

<sup>6</sup> Prepared by the Women's Bureau, U. S. Department of Labor.



usually have access to a wider variety of equipment and tend to be less specialized than those working with a particular physician or agency.

#### *Training and Other Qualifications*

Graduation from an approved school of physical therapy is requisite for registration with the American Registry of Physical Therapy Technicians; admission requires graduation from a school of nursing, a school of physical education, or 60 college semester hours, including courses in the physical and biological sciences. The American Physiotherapy Association reports that an increasing percentage of the 25 training schools in this field will soon require 3 years of college education. The length of the approved physical therapy course ranges upward from a minimum of 10 months. Good health is essential. More than 90 percent of physical therapists are women.

#### *Outlook*

There was an acute shortage of trained physical therapists during the war and the demand is still greater than the supply. Although graduating classes increased from about 150 in 1941 to 507 in 1946 and there were approximately 250 additional graduates of emergency war courses, the needs still have not been met. The additional numbers trained under the Army program and those who will be graduated annually from approved schools will be absorbed for several years to come. Applications for training are now exceeding training capacity so that only the best qualified are selected.

Veterans' hospitals will continue to need most of the physical therapists. A marked increase is expected in the number of veterans who need treatment but do not require hospitalization. They will be given physical-therapy treatment as outpatients. Expanding civilian rehabilitation and crippled-children programs, in which States are aided by Federal funds, also have encouraged the use of physical therapy in the rehabilitation of both adults and children. The clinical and laboratory research of the National Foundation for Infantile Paralysis has found that prompt physical-therapy treatment is of great value in polio-

myelitis. As techniques and equipment continue their development, more physicians will recommend physical therapy for patients.

There were 3,391 full-time physical therapists in 1946 in all hospitals in the United States. In 1947, there were 4,400 registered physical therapists, of whom about 3,900 were working. Approximately 1,100 additional workers were not registered. Six-month's emergency courses in Army hospitals were given for selected college graduates during the war, and enlisted men and women in the Navy were trained to serve as assistants under the supervision of a physical therapist or a medical officer. The assistants were not qualified for registration as physical therapists and could not practice as such without additional training. The rate of withdrawal from the occupation may be high if many of the recently trained young women marry and retire fully or partially from practice after only a few years of service. It is estimated by the American Physiotherapy Association that altogether 15,000 physical therapists will be needed by 1960.

#### *Earnings*

Before the war beginners received about \$1,500 annually, but in 1947 graduates of approved schools started at \$2,200 to \$2,400. Except for small annual increases, advancement is mainly through the addition of supervisory or instructional duties at salaries ranging upward to \$4,000. Civil-service entrance salary for physical therapists is \$2,974. Allowance for maintenance is sometimes given by hospitals.

#### *Where To Go for More Information*

Additional information on the outlook for women as physical therapists is given in the following publication:

U. S. Department of Labor, Women's Bureau—Physical Therapists. Bulletin 203, No. 1. 14 pp. Washington, 1945. Price 10 cents.

Information may also be obtained from:

The American Physiotherapy Association,  
1790 Broadway,  
New York 19, N. Y.

## Medical Record Librarians <sup>7</sup>

(D.O.T. 0-23.25)

### *Outlook Summary*

Good employment opportunities for graduates of approved schools in this relatively small but growing occupation. New entrants will encounter considerable competition unless specially trained.

### *Nature of Work*

The medical record librarian is in full charge of the medical or clinical reports of a hospital. Duties consist of planning, organizing, and managing the records department, as well as cataloging, filing, and compiling medical and surgical statistics, and assisting physicians in using them for research. The medical record librarian should not be confused with medical librarians who have charge of a library in a hospital or medical institution and have nothing whatever to do with the patients' records.

Medical record librarians are employed in hospitals or other medical institutions throughout the country. Both men and women are employed in this occupation, although women predominate.

### *Training and Other Qualifications*

Only a small proportion of those engaged in this occupation at present are graduates of the 12 approved schools. Two years of college or graduation from a recognized school of nursing is usually required for entrance to an approved course, which lasts 12 months. Three schools whose courses lead to a degree require only a high school education. All students must be proficient in typing and shorthand. Regular courses include at least 208 hours on medical fundamentals and terminology. Because of insufficient personnel a short in-service training program, financed by the National Foundation for Infantile Paralysis, has been established by the American Association of Medical Record Librarians. Institutes are also being conducted jointly with the American Hos-

pital Association. These two types of educational programs are being sponsored to assist those now working in medical record libraries who are unable to attend an approved school.

Less than a third of the medical record librarians employed full time in registered hospitals are registered by the Registry of the American Association of Medical Record Librarians. Requirements for registration include: Graduation from an approved school or a high-school graduation plus 3 to 5 years' experience in this work; minimum age of 21 years; active employment in this occupation; the passing of an examination covering pertinent subject matter.

### *Outlook*

There is a steadily increasing need for medical record librarians due to increases in the number of hospitals for veterans and civilians. More and more persons are seeking hospital care during illness. As the science of medicine progresses, as new treatments develop, the record-keeping function becomes more significant. Hospital records supply much of the raw material on which medical research and further progress depend. They also furnish a basis for evaluating the effectiveness of the hospital and its staff and the extent of their progress.

There were 3,819 persons employed in full-time work of this type in registered hospitals in 1946 and another group of more than 1,000 engaged in part-time work. The combined capacity enrollment of the 12 schools approved by the American Medical Association is only 140 students. In 1946, 25 students were graduated from approved courses, and an additional 18 completed special courses for experienced but untrained librarians.

The several thousand nonschooled workers employed should have no difficulty in retaining their posts, especially if they supplement their training by special short courses in approved schools. However, untrained persons will find it increasingly difficult to enter this field.

<sup>7</sup> Prepared by the Women's Bureau, U. S. Department of Labor.

*Earnings*

Annual salaries for medical record librarians throughout the United States in 1947, ranged from \$2,400 to \$5,000, according to the American Association of Medical Record Librarians. Advancement opportunities lie in supervisory work, especially in large hospitals.

*Where To Go for More Information*

Additional information on the outlook for

women as medical record librarians is given in the following publication:

U. S. Department of Labor, Women's Bureau—  
Medical Record Librarians. Bulletin 203, No. 6.  
9 pp. Washington, 1945. Price 10 cents.

Information may also be obtained from:

American Association of Medical Record Librarians,  
18 E. Division St.,  
Chicago, Ill.

## Dental Hygienists<sup>8</sup>

(D.O.T. 0-50.07)

*Outlook Summary*

Good opportunities for those trained in approved schools. There are increasing opportunities in public-health work, where qualifications and requirements are comparatively high.

*Nature of Work*

The dental hygienist cleans teeth and performs other preventive services consistent with the respective State dental laws or promotes dental health through educational activities in schools, clinics, and institutions.

Most dental hygienists are employed in dentists' offices, but in 1941 there were only 4.2 hygienists for every 100 dentists. A large number are employed in public-health programs conducted by public-school systems or by State or local health departments. Hospitals, clinics, and dental hygiene training schools represent the other major employers in this field. This occupation should be distinguished from that of the dental assistant who performs X-ray and laboratory work and clerical duties. A dental hygienist may also be trained to perform these duties, but, for her, they are a secondary function. All persons in this occupation are women.

*Training and Other Qualifications*

A minimum requirement for entrance to a school for training dental hygienists is high-school graduation in a college preparatory curriculum. Stu-

dents must be 18 years of age and in good health. The length of the course in an approved school is 2 years. Graduation from an approved school of dental hygiene and the successful passing of an examination given by a State board of dental examiners are requirements for licensure in 39 States, the District of Columbia, and Hawaii.

Dental hygienist gives treatment to aid in prevention of tooth decay

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<sup>8</sup> Prepared by the Women's Bureau, U. S. Department of Labor.

*Outlook*

There is general agreement that the opportunities for dental hygienists in public-health and institutional work are gradually increasing. There is a difference of opinion about the future demand for those who work in dentists' offices. This difference arises out of the fact that both the dental hygienist and the dental assistant who is essentially a clerical worker are valuable to a dentist. In 1941 dental assistants outnumbered dental hygienists more than 10 to 1. There is a definite trend toward the employment by dentists of at least one person, since it increases the number of patients a dentist can serve. There also has been more and more emphasis placed upon group practice by several dentists which often results in their joint employment of one dental hygienist.

In 1945, the number of licensed dental hygienists in the United States totaled more than 7,000. In 1947 all schools were full and had to turn down applicants. Preference was given to those with previous college work. The number of dental hygienists graduating annually from the 14 approved schools was 350 in 1947. By 1950, with the opening of 3 additional schools, the output will be 450. It has been estimated that more than twice this number could be used annually.

*Earnings*

There is a wide range in salaries due to differences in the income levels of the dentists and to the sizes of communities and, in part, to the wide variation in background and personal qualifications of those practicing dental hygiene. In 1945 most dental hygienists, however, were earning between \$2,000 and \$2,500 a year. The beginning yearly Federal civil-service salary for dental hygienists in 1947 was \$2,394. Only a small proportion of the dental hygienists work for the Federal Government, however. There are very few opportunities for supervisory work except in very large institutions.

*Where To Go for More Information*

Additional information on the outlook for women as dental hygienists is given in the following publication:

U. S. Department of Labor, Women's Bureau—  
Dental Hygienists. Bulletin 203, No. 10. 17 pp.  
Washington, 1945. Price 10 cents.

Information may also be obtained from:

American Dental Hygienists Association,  
1704 N. Troy St., Apartment 824,  
Arlington, Va.

# *Engineering and Other Technical Fields*

The dramatic economic and social changes reviewed in the introduction to this handbook have been caused mainly by technological developments—the invention of new machines and processes, of more efficient ways of getting things done. At the forefront of economic change, therefore, are the engineer and the scientist.

By far the largest technical group is the engineering profession, in which a quarter of a million were employed before the war. Next largest is the profession of chemistry. Draftsmen constitute the largest semiprofessional occupation, with laboratory technicians close behind. Important, but relatively small in size, are such occupations as physicist and mathematician.

Few occupational fields have grown as rapidly as the technical fields in the past few decades. In 1880 there were only about 7,000 engineers. The profession expanded rapidly, branching out into its major divisions—civil, mechanical, electrical, mining and metallurgical, and chemical engineering. By 1940 the number of engineers employed was 35 times higher than in 1880. A similar rapid expansion took place in some of the other fields in the physical sciences.

During the war the need increased greatly for these technical men, for research and development of new products and weapons, and for supervision over production. After the war expenditures on research and development increased, and construction activity boomed. The number of engineers employed increased from about 245,000 in 1940 to well over 300,000 in 1947. Physicists, mathematicians, and other scientists whose main work had

been in the classroom and the university laboratory suddenly found themselves very much in demand in industry and government. At the same time, the number of scientists being trained was reduced by the withdrawal of college students by selective service. In the war years, 1942 to 1945, the number of Ph. D. degrees granted was nearly one-quarter less than in the preceding 4-year period.

Since the war, however, enrollment in these courses in the engineering schools and the colleges has increased greatly, and it is likely that the shortages of trained men will be alleviated in a few years. This suggests that competition will become keener, and that the young man or woman who plans to enter one of the engineering, physical science, or technical fields should get the best possible preparation.

Employment opportunities for women in the scientific and technical fields are described in Bulletin 223 of the Women's Bureau, United States Department of Labor. The bulletin was published in the latter half of 1948 in eight separate pamphlets. The bulletin numbers and the fields covered by each are as follows: No. 223-1, The Outlook for Women in Science—Introduction; No. 223-2, Chemistry; No. 223-3, Biological Sciences; No. 223-4, Mathematics and Statistics; No. 223-5, Architecture and Engineering; No. 223-6, Physics and Astronomy; No. 223-7, Geology, Geography, and Meteorology; No. 223-8, Occupations Related to Science. Information on this series may be obtained from the Women's Bureau, United States Department of Labor, Washington 25, D. C.

## **Civil Engineers**

(D.O.T. 0-16.01)

### *Outlook Summary*

Good prospects for the next several years for those already trained. Persons who start training now (early 1948) or in the near future may be confronted with keen competition for jobs.

### *Nature of Work*

A civil engineer plans, designs, and supervises the construction of roads, bridges, buildings, dams, tunnels, transportation facilities, and other projects for public, industrial, or commercial use.

Most civil engineers work in technical administrative-management, design, or construction supervision. Others are employed as consulting engineers, college teachers, in research or development work, or in selling. The major specialized fields of civil engineering are: structural, highway, hydraulic, railroad, sanitary and public health, and agricultural.



COURTESY OF BUREAU OF RECLAMATION, U. S. DEPARTMENT OF INTERIOR  
Frequently, the civil engineer is called upon to supervise construction jobs on site—sometimes in remote locations

### *Where Employed*

About half of all civil engineers are employed in local, State, or Federal Government agencies. The private construction industry is a large employer. Many are also employed in the railroad industry and public utilities. Some are found in the iron and steel industry, petroleum refinery, and other industries. Civil engineers are employed in all parts of the country; there are jobs in every State and city. Frequently the engineer is called upon to work at the construction site, which is sometimes in a remote location. Some civil engineers from the United States work in foreign countries. In general, the occupation may require a good deal of moving from one place to another, although there are many jobs in civil

engineering—such as city engineering positions—in which there is virtually no traveling at all.

### *Training and Qualifications*

A bachelor's degree in civil engineering is usually the minimum requirement for new entrants. A better-than-average aptitude for mathematics, physics, and mechanics is indispensable for students. A great many students admitted to engineering schools fail to complete the course and many of those who complete their schooling take more than 4 years to do so.

Registration is required in practically all States for the legal right to practice "professional engineering" if public welfare or safeguarding of health and property are concerned. Many civil engineers, however, are engaged in work which does not require registration. Requirements for registration as a professional engineer as a general rule are: graduation from an approved engineering college, plus 4 years of experience and passing a State board examination.

### *Outlook*

Growth in this branch of engineering has not been so rapid in general as in the other major engineering fields in recent decades, partly because the construction industry has not grown as rapidly as some of the newer industrial fields. Like the construction industry as a whole, this occupation has wide swings in employment opportunities between periods of prosperity and depression.

In 1940, civil engineers were the largest group of engineers, numbering over 89,000. Nearly 10 percent were unemployed, and many men with civil engineering degrees were unable to get any job better than a subprofessional position as draftsman or surveyor.

The demand for civil engineers will be very high during the next several years, owing to the large backlog of civilian construction piled up during the war and the previous decade, when building activity was low. After this demand has been satisfied somewhat, the level of construction activity may drop. It will, however, remain substantially above prewar levels providing general business conditions remain high.

Total enrollment in engineering schools is at record levels, about three times as high as prewar enrollments. Civil engineering enrollment is also

very high. In a few years, the number of students graduating will exceed those needed for the expected expansion in employment and for replacement needs owing to death and retirement (which average about 2,000 a year). Thus, although the demand for civil engineers will be unusually high for the next several years, keener competition may again be experienced in the profession in the next decade, unless there is careful counseling and selection of persons who start training now.

Persons now in training and those entering in the future would be well advised to get the best possible, all-around training to meet this competition for jobs.

### *Earnings*

In 1946, beginners had a median monthly salary of around \$240; those with 5 years' experience made about \$60 more. After 10 years in the profession, the median monthly salary was around

\$350; with 20 years' experience, about \$390. Salaries have probably increased somewhat since 1946. Salaries of \$10,000 per year and over are not uncommon in this field, especially in positions involving management in addition to technical functions.

Individual earnings vary with length of experience, education, type of work, and personal competence. Engineers with advanced degrees usually earn more than those at the same age and experience levels with less academic training.

### *Where To Get More Information*

American Society of Civil Engineers,  
33 W. 39th St.,  
New York 18, N. Y.

Information on earnings is given in the following publication:

*The Engineering Profession in Transition.* Engineers Joint Council, 33 West Thirty-ninth Street, New York 18, N. Y. 1947, price \$1. Data are from a survey covering only members of six professional societies.

## Electrical Engineers

(D.O.T. 0-17.01)

### *Outlook Summary*

Expanding field; good prospects for those already well trained. However, those completing training and those entering college will probably meet intense competition for jobs.

### *Nature of Work*

The electrical engineer is concerned with the generation, transmission, and utilization of electricity. Among the major branches of electrical engineering are: Power generation, transmission, and distribution; illuminating engineering; wire communications; radio and electronics engineering; transportation engineering; and electrical machinery and equipment. The most important fields of functional specialization are: Research and development, operation or application, design, teaching, and selling.

### *Where Employed*

About two-thirds of all electrical engineers are employed in the following industries: Electrical

machinery manufacturing, electric utilities (generation, transmission, or distribution), communications (telegraph, telephone, radio), or electronics manufacturing.

While employment is heavily concentrated in the industrial centers where electrical equipment is manufactured, over 65 percent of the engineers are in the States of New York, Pennsylvania, New Jersey, Ohio, Illinois, Massachusetts, and California. There are jobs with electric light and power companies, telephone companies, and radio stations in every State and in small cities throughout the country. Some American electrical engineers are also employed in foreign countries.

### *Training and Qualifications*

Graduation from a recognized engineering college is the minimum educational requirement for electrical engineering work. Persons contemplating an electrical engineering career should rate well above average in mathematics and science courses in high school. A large part of those

who enter engineering schools fail to graduate, and successful engineers are mostly found among those with high scholastic records. A broad but intensive fundamental training is thought by many to be preferable to specialization for college students. Larger electrical manufacturing establishments have training courses of from 1 to 2 years for college graduates, thus supplementing college instruction by training within industry.

Registration is required by practically all States for the legal right to practice "professional engineering" if public welfare or safeguarding of life, health, and property are concerned. Many electrical engineers, however, are engaged in work which does not require that they be registered. Those without certificates of registration may work under engineers who have such certificates and who thereby assume the public responsibility contemplated in the registration laws. Requirements for registration as professional engineer are: Graduation from an approved engineering college, plus 4 years of experience and passing of a State examination. Examining boards may accept a longer period of experience as a substitute for a college degree.

Advancement depends upon engineering ability, competence, and persistent hard work. After some years of accomplishment, an executive position may be obtained.

### *Outlook*

This field has grown rapidly in recent decades, and in 1940, with about 56,000 members, it was the third largest engineering field. Initial growth was caused by the development of the electric utility industry; more recently the development of radio and electronics has been the main cause of expansion.

The demand for electrical engineers will increase in the future because of the expanding use of electricity in industry, transportation, communication, in homes, on farms, in therapeutic work, and because of new developments in the field of electronics, such as radar and television. Contemplated public and private power developments should provide openings for additional men. Industry also needs engineers who are familiar with the technology and possibilities of new materials to be used in the manufacture and use of electrical

equipment. There will also be some opportunities in teaching and in other fields.

However, total enrollment in engineering schools is more than three times as high as average prewar enrollment. The number of electrical engineering students is exceedingly high, probably more than enough to provide for replacement of deaths and retirements—estimated at 1,000 annually—and the expected expansion of the occupation. Due to the contacts many men in the services had with radar, radio, and other phases of electrical engineering, large numbers were attracted to this field. It is likely that many of the graduates within the next few years will be unable to find jobs in the field, particularly if enrollments continue at the present high levels. Therefore, persons entering school now would be well advised to get the best possible, all-round training.

### *Earnings*

In 1946, beginners had a median monthly salary of about \$235; those with 5 years' experience made about \$80 more. After 10 years in the profession, the median monthly salary was around \$370, and, at 20 years' experience, about \$460. Salaries have probably increased generally since 1946. Salaries of \$10,000 to \$15,000 a year and over are not uncommon in electrical engineering.

Individual earnings depend on length of experience, education, personal competence, and type of work. Electrical engineers with doctors' degrees earn a great deal more than those at the same age and experience levels with only masters' or bachelors' degrees.

### *Where To Get More Information*

Institute of Radio Engineers,  
1 E. 79th St.,  
New York, N. Y.

American Institute of Electrical Engineers,  
29 W. 39th St.,  
New York, N. Y.

Information on earnings is given in the following publication:

*The Engineering Profession in Transition.* Engineers Joint Council, 33 West Thirty-ninth Street, New York 18, N. Y. 1947, price \$1. Data are from a survey covering only members of six professional societies.



## Mechanical Engineers

(D.O.T. 0-19.)

### *Outlook Summary*

Good prospects for those already well trained. Increasing competition for new entrants within the near future.

### *Nature of Work*

Mechanical engineers design and supervise the production of machinery and other equipment which produces, transmits, or uses mechanical energy. The major specialized fields are: Aeronautical, automotive, marine, railway, heating, ventilating and air-conditioning engineering, and power generation and production. Major functions are design, development, construction, manufacture, operation, or sales.

### *Where Employed*

Many industries employ mechanical engineers. More than half are in the metalworking industries—principally in the manufacture of iron and steel and their products, machinery, and transportation equipment. Jobs are concentrated in the areas in which this type of manufacturing is located. Though they may be found in all States, about 70 percent are employed in the following eight States: New York, Ohio, California, Pennsylvania, Illinois, New Jersey, Michigan, and Massachusetts.

### *Training and Qualifications*

Graduation from a recognized engineering college is the minimum educational requirement. Introduction of a 5-year undergraduate course, or the establishment of professional engineering education on a graduate basis is being discussed by some educational authorities. A better-than-average ability in mathematics and physics is essential for graduation and advancement. Before the war, a high proportion of those who entered engineering school failed to graduate, and many took longer than the regular 4 years to graduate. Some industrial experience prior to graduation, supplementing formal work in college, is recom-

mended. Most large concerns have training programs where graduates are put in turn through various departments; drafting room, shop, engineering department. Advancement depends on persistent study after graduation to keep abreast of new discoveries and methods. After several years of experience in positions of responsibility an executive position may be achieved.

Registration is required in practically all States for the legal right to practice "professional engineering" if public welfare or safeguarding of life, health, and property are concerned. Many mechanical engineers, however, are engaged in work which does not require their registration.

### *Outlook*

Prospects are good for persons already well trained and experienced. The second largest engineering group before the war (with about 86,000 members in 1940), mechanical engineers are now the largest. Many persons entered the field during the war without engineering degrees. In addition, many of those who were in the armed forces have returned to civilian jobs. Mechanical engineers are being used in increasing numbers by many varied industries. In addition, research opportunities are expanding, and there is great need in educational institutions.

Employment in mechanical engineering will continue to expand over the long run, although at a slower rate than during the last 10 years. As mentioned above, a large proportion of mechanical engineers are employed in the metalworking industries. These industries will probably expand for several years, although it will be some time before they reach the peaks attained during the war.

New entrants, however, will soon meet increasing competition. Enrollments in engineering schools are at record levels, mechanical engineering being the largest group. Within a few years, the number of graduates will exceed those needed each year for replacement needs (estimated at

about 2,000 annually) and for the expansion expected in employment. In some branches of mechanical engineering, such as aeronautical, new graduates are already having difficulty in obtaining positions in their field. Persons who are able to get advanced schooling and a well-rounded background will have an advantage in securing positions.

### *Earnings*

In 1946 beginners had a median monthly salary of about \$225; those with 5 years' experience made approximately \$340. The median monthly salary of those with 10 years' experience was about \$405, and it was \$495 for those with 20 years' experience.

Salaries have probably increased somewhat since that time. Monthly salaries of \$800 to \$1,000 and over are frequent in mechanical engineering.

Individual earnings vary with education, length of experience, personal competence, and type of work.

### *Where To Find Out More About Mechanical Engineering*

American Society of Mechanical Engineers,  
29 W. 39th St.,  
New York, N. Y.  
Engineers Council for Professional Development,  
29 W. 39th St.,  
New York, N. Y.

Information on earnings may be found in the following publication:

*The Engineering Profession in Transition.* Engineers Joint Council, 33 West Thirty-ninth Street, New York 18, N. Y. 1947, price \$1. Data are from a survey covering only members of six professional societies.

## Chemical Engineers

(D.O.T. 0-15.01)

### *Outlook Summary*

Expanding field, offering good employment prospects for those already trained or who will complete their training in immediate future. Competition will become increasingly keen as result of present record enrollments in engineering schools.

### *Nature of Work*

The chemical engineer is concerned mainly with carrying out chemical processes on an industrial scale. He may direct every step from the design of the plant and equipment to its actual operation. Largest numbers are engaged in technical administration, development, applied research, design, and production work.

### *Where Employed*

A great many industries employ chemical engineers, with the majority in production work. More than half are in the chemical industries and petroleum refining. The following States furnish employment for about 60 percent of all these engineers: New York, New Jersey, Pennsylvania, Ohio, Texas, Illinois, and California.

### *Training and Other Qualifications*

Training in physics and mathematics, as well as in chemistry and engineering, is important. A bachelor's degree is the minimum requirement for new entrants. Some universities require 5 or 6 years of study for a B. S. degree in chemical engineering, but most require only 4. Graduate training is desirable. It is important to select a properly accredited school of engineering, since persons trained at such schools generally have the best employment opportunities.

Extremely few chemical engineers (only a fraction of 1 percent of all those employed) are women.

### *Outlook*

Prospects are very good for those already trained. The number of chemical engineers (probably around 30,000 in 1948) has doubled since 1940. Despite this fact, there is a shortage in this field, owing to the growth of chemical industries over prewar size, the increasing use of chemical engineers in other industries, and expanding research and teaching needs.

Employment in the profession will probably continue to expand. However, new entrants will

soon meet increasing competition since enrollments are now at an all-time high. The numbers needed to replace those retiring or dying will be small, as the average age of chemical engineers is low. Best opportunities will be for those with advanced training; the proportion of people with graduate training is higher among chemical engineers than in most other branches of engineering.

### *Earnings*

In 1946, beginners had a median monthly salary of about \$240; those with 5 years' experience made about \$100 more. After 10 years in the profession, the median salary was around \$400, and about \$500 at 20 years' experience. There is some evidence that salaries have increased since 1946. Monthly salaries of \$800 to \$1,000 and over are not uncommon in this field.

Earnings depend not only on length of experience but on type of work done, amount of education, and individual ability. In general, administrative jobs pay the highest salaries; development and testing jobs pay considerably less. Engineers with doctors' degrees earn considerably more than those at the same age and experience levels with only masters' or bachelors' degrees.

### *Where To Find Out More About Chemical Engineering*

Information on schools, scholarships, and other subjects may be obtained from:

American Institute of Chemical Engineers,  
120 E. 41st St.,  
New York 17, N. Y.

Information on the general fields of chemistry and chemical engineering may be obtained from:

American Chemical Society,  
1155 16th St. NW.,  
Washington 6, D. C.

Information on earnings is given in the following publications:

Factors Affecting Earnings in Chemistry and Chemical Engineering. Bulletin No. 881. U. S. Bureau of Labor Statistics, 1946. Price 10 cents. Superintendent of Documents, Washington 25, D. C.

*The Engineering Profession in Transition.* Engineers Joint Council, 33 West Thirty-ninth Street, New York 18, N. Y. 1947, price \$1. Data are from a survey covering only members of six professional societies.

*See also:* Chemists, page 74.

## Mining Engineers

(D.O.T. 0-20.)

### *Outlook Summary*

Good prospects in next few years for engineers already trained and in training. Persons who start training may be confronted with difficulties in finding positions by the time they enter the profession.

### *Nature of Work*

Mining engineers are responsible for locating and mining coal, petroleum, metallic ores, and non-metallic materials; planning construction of shafts and tunnels, devising the means of extracting the minerals, the methods to be used in transporting them to the surface, and, in the case of ores, the methods to be used in separating them from worthless earth, rock, or other minerals. They may also be concerned with the design, construction, and installation of water supply, ventilation equip-

ment, and electric light and power facilities and are responsible for mine safety. Other major functions are: prospecting (search for deposits), development (opening the mine and extending it), and operations. Major specialties in the field are: coal, natural gas, petroleum, metal and mineral mining, and mine-safety engineering.

### *Training and Qualifications*

A bachelor's degree for 4 years' work in engineering college (mining, petroleum, geological engineering) is the minimum requirement for new entrants. There is a trend toward requiring 5 years' work for a bachelor's degree. Before the war, a high proportion of those who entered engineering school failed to graduate, and many took longer than the regular 4 years to graduate. Industrial experience prior to graduation, supple-

menting formal work in college, is recommended. Graduate degrees (master or doctor of engineering in mining, geology, geophysics, or other fields) may be obtained after a specified number of years of experience subsequent to earning a B. S. degree, plus submission of an approved thesis.

During the first years after graduation, practical experience in mining engineering is usually acquired at some simple work such as mine surveying, elementary design work on mine construction, mine sampling, or as junior geologist.

Registration is required in practically all States for the legal right to practice "professional engineering" if public welfare or safeguarding of life, health, and property are concerned. Requirements for registration as professional engineer are: Graduation from an approved engineering college, plus 4 years of experience and passing of a State examination. Those without certificates of registration may work under engineers who have such certificates.

After years of progressive experience, persons with administrative ability may achieve managerial positions. Research, teaching, and consulting also provide advancement opportunities.

### *Outlook*

Demand for mining and metallurgical engineers will exceed prewar levels because of search for oil pools at greater depths, development of new scientific methods in order to reduce costs, and greatly increased research budgets. However, opportunities for new entrants are comparatively few, as mining and metallurgical engineers constitute the smallest group among the major lines of engineering. In 1940, they numbered about 10,000; nearly 10 percent were unemployed. Although the demand for mining and metallurgical engineers will be higher for the next several years than before the war, keener competition may again be experienced in the profession, unless there is

careful counseling and selection of persons who start training now. Most opportunities are in metal mining, crude petroleum and natural gas production, while comparatively small numbers are engaged in coal mining and in nonmetallic mining and quarrying. Job opportunities for mining engineers are found at the location of mineral deposits—often in out-of-the-way places in mountains or deserts.

### *Earnings*

In 1946, beginners in mining and metallurgical engineering combined had a median monthly salary of about \$240; those with 5 years' experience made about \$80 more. After 10 years in the profession, the median monthly salary for both fields was around \$410, and with 20 years' experience, about \$520. Monthly salaries of \$800 to \$1,000 and more are frequent in this field.

Individual earnings depend upon length of experience, education, ability, and type of work done. Engineers with advanced degrees earn considerably more than those at the same age and experience levels with lesser training.

### *Where To Find Out More About Mining Engineering*

American Institute of Mining and Metallurgical Engineers,  
29 West 39th St.,  
New York 18, N. Y.  
Engineers Council for Professional Development,  
29 West 39th St.,  
New York 18, N. Y.

Information on earnings may be found in the following publication:

*The Engineering Profession in Transition.* Engineers Joint Council, 33 West Thirty-ninth Street, New York 18, N. Y. 1947, price \$1. Data are from a survey covering only members of six professional societies.

## Metallurgical Engineers

(D.O.T. 0-14.)

### *Outlook Summary*

Good prospects for engineers already well trained. Those who start training now (early 1948) may be confronted with keen competition by the time they enter the profession.

### *Nature of Work*

A metallurgical engineer analyzes ores; designs processes to eliminate worthless minerals before the ore goes to the smelter; directs industrial processing of ores and the treatment and alloying of metals; performs research in order to improve production methods or develop new products; assumes responsibility for the design, construction, installation, and operation of pilot plants, and for coordination of research. The majority are employed in the following industries: Iron and steel and their products, machinery, transportation equipment, and mining.

### *Training and Qualifications*

A bachelor's degree for 4 years of work in an engineering college (metallurgical engineering, chemistry, or related branch of engineering), or a bachelor's degree with a major in metallurgy, engineering sciences, or chemistry is the minimum requirement for new entrants.

During the first years after graduation experience in metallurgical engineering is usually acquired in assaying and analyzing samples of ore, or in assisting in the operation of furnaces or equipment.

After years of progressive experience, persons with administrative ability and general metallurgical knowledge may achieve managerial positions, while those with advanced knowledge of pure and applied science may achieve responsible research positions.

### *Outlook*

The demand for qualified metallurgical engineers will exceed prewar levels because of industrial expansion and new production lines which tend to increase the demand for metals or alloys to serve specific purposes. This requires metallurgical work on problems concerning alloys and development of metals adaptable to various uses. While students with high scholastic records will be sought after, opportunities for new entrants are comparatively few, since the profession is relatively small. In 1940, mining and metallurgical engineers together numbered about 10,000, and nearly 10 percent were unemployed. Although the demand for metallurgical engineers will be higher for the next several years than before the war, keener competition may again be experienced in the profession, unless there is careful counseling and selection of persons who start training. In addition to the mining and basic metal industries, there are also some opportunities in other industries making finished products from metals which may require the special knowledge of metallurgists in solving manufacturing or marketing problems.

### *Earnings*

In 1946, beginners in both metallurgical and mining engineering had a median monthly salary of about \$240; those with 5 years' experience made about \$80 more. After 10 years in the profession, the median monthly salary for both fields of engineering was around \$410, and at 20 years' experience, about \$520. Monthly salaries of \$800 to \$1,000 and more are frequent in this field.

Individual earnings depend upon length of experience, education, ability, and type of work done. Engineers with advanced degrees earn considerably more than those at the same age and experience levels with lesser training.

### *Where To Find Out More About Metallurgical Engineering*

American Institute of Mining and Metallurgical Engineering,  
29 W. 39th St.,  
New York, N. Y.

Engineers Council for Professional Development,  
29 W. 39th St.,  
New York, N. Y.

Information on earnings is given in the following publication:

*The Engineering Profession in Transition.* Engineers Joint Council, 33 West Thirty-ninth Street, New York 18, N. Y. 1947, price \$1. Data are from a survey covering only members of six professional societies.

## Industrial Engineers

(D.O.T. 0-18.01 and .03)

### *Outlook Summary*

Expanding field. Good prospects for engineers already trained, but persons who start training now (early 1948) are likely to face keen competition by the time they enter the profession.

### *Nature of Work*

Industrial engineers are concerned with planning, organization, methods, and control of production. They often specialize in one or more branches of the profession, such as factory lay-out; time, motion, and incentive studies; or safety engineering. Other major branches are: Production and material control, production cost control, training of production personnel, and development of wage-payment plans. The terms "industrial engineering" and "management engineering" are sometimes used interchangeably, but the tendency is to apply the former to positions concerned with production problems only, the latter to positions of broader responsibility or to independent consultants dealing with problems of company organization and policy, marketing, finance, and personnel, as well as production.

### *Training and Qualifications*

There is a trend toward requiring a bachelor's degree in industrial engineering for new entrants, though some men with mechanical engineering or other related training may be able to enter the profession. An industrial-engineering curriculum comprises not only engineering courses but also economics, statistics, marketing, production, management, accounting, and personnel administra-

tion. Courses in English composition and psychology are also important. Industrial experience prior to graduation is recommended. Larger companies put graduate engineers through training programs covering all aspects of the plant's operations.

Registration is required in practically all States for the right to practice professional engineering if public welfare or safeguarding of life, health, and property are concerned. Many industrial engineers, however, are engaged in work which does not require registration.

### *Outlook*

The demand for industrial engineers will exceed prewar levels in the immediate future because of greater industrial activity and the need to speed up production and lower costs. There will also be expanding opportunity in the long run, owing to the increasing importance of scientific management and safety engineering. In 1940, industrial engineers numbered only about 10,000, of whom over 5 percent were unemployed. During the war, many persons with incomplete college education or with degrees in related fields were given some training in industrial engineering, to meet the shortage of qualified men. In addition, many students are enrolled in industrial engineering. After several years, when these students are graduated, keen competition may therefore be experienced in the profession, despite the increased demand. There is need for careful counseling and selection of persons who start training. Good scholastic records and rec-

ommendation by one's college teachers will become increasingly important in securing a position, particularly with one of the larger companies.

### *Earnings*

In 1946, beginners earned between \$220 and \$240 per month. After 5 years' experience they received around \$350 and after 10 years' experience around \$410. Salaries have probably increased since 1946 to some extent. Monthly salaries of \$800 to \$1,000 are not uncommon, particularly in consulting and executive positions.

### *Where To Find Out More About Industrial Engineering*

Society for the Advancement of Management, Inc.,  
84 William St.,  
New York, N. Y.

American Society of Safety Engineers,  
Engineering Section,  
National Safety Council,  
20 North Wacker Drive,  
Chicago 6, Ill.

Association of Consulting Management Engineers, Inc.,  
347 Madison Ave.,  
New York 17, N. Y.

American Society of Mechanical Engineers,  
29 W. 39th St.,  
New York, N. Y.

## Ceramic Engineers

(D.O.T. 0-15.11)

### *Outlook Summary*

Small but expanding field. Good prospects for persons already trained but those who start training may face keen competition by the time they enter the profession.

### *Nature of Work*

Ceramic engineers are concerned with the mining and processing of clay, silicates, and other non-metallic minerals and the manufacture of products from these raw materials; also with the design and construction of plant equipment and structures. They may work in research or sales. Specialization is usually by type of product—for example, structural materials (such as brick, tile, and terracotta), pottery, glass, enameled metals, abrasives, refractories (fire and heat-resistant materials, such as fire brick), limes and plasters, cements, and many others.

### *Where Employed*

More than half of all ceramic engineers are employed in the stone, clay, and glass industries. Others are found in iron and steel and their products, electrical machinery, chemicals and their products, and in other industries. Also, some are employed by educational institutions and by other organizations.

More than three-quarters are employees of pri-

vate firms, organizations or institutions, while only about one-tenth worked for some public authority—primarily the Federal Government. Nearly two-thirds of all ceramic engineers are employed in five States—Ohio, Pennsylvania, New York, New Jersey, and Illinois. Almost one-quarter are found in the State of Ohio.

### *Training and Qualifications*

Trend is toward requiring a bachelor's degree in ceramics or ceramic engineering or some related branch such as chemical, mechanical, or mining engineering, preferably from an accredited school of engineering. Some persons without formal engineering training may enter the profession by acquiring many years of progressive industrial experience. Courses in ceramics or ceramic engineering are offered by relatively few schools; they are usually of 4 years' duration. Graduate training is desirable for some types of work.

### *Outlook*

Employment will probably grow rapidly for several years and more slowly thereafter. At the present time (early 1948), it is estimated that around 3,000 ceramic engineers are employed. Many technological improvements are expected in the ceramics industries in the next few years; additional engineers will be needed to bring about those improvements. Other factors which will

tend to increase the number employed are the new uses to which nonmetallic minerals are being put and the trend toward expansion in industries using these materials. Greater use of glass, enameled metals, abrasives, and other ceramic products will require research and design for adaptation of products to various uses and thus will contribute to the increasing demand for engineers. In addition, the expected growth in construction, which—particularly in residential projects—is depending more and more on the use of cement and structural clay products, will provide for greater opportunity. Since the field is so small, however, openings will be few in any one year.

At present, the profession is not overcrowded but it may become so within the next few years. During the war, the shortage of engineers was acute, and many people entered the profession with incomplete college training or with degrees in related fields. Since VJ-day, the shortage has decreased somewhat and more students are enrolled in ceramic engineering than before the war. This is also true in fields of engineering which are closely related. Enrollments are expected to be high also in the academic year 1948–49. Therefore, keen competition may be experienced in the profession, despite the increased demand for ceramic engineers, unless there is careful selection and counseling of persons who start training now. Recommendation by one's college teachers and good scholastic records will become more and more important in getting jobs, as the supply of ceramic engineers overtakes the demand.

### *Earnings*

A survey of members of the Institute of Ceramic Engineers for the year 1947 reports the following earnings data: Ceramic engineers with between 5 and 9 years' experience had a median monthly salary of \$390; those with 10 to 14 years' experience made about \$440; and those with between 15 and 19 years' experience received nearly \$510. Those with 25 or more years in the profession had a median monthly salary of \$700. Many engineers in this field received considerably more—some making \$1,000 per month or more.

Individual earnings varied particularly with experience (increasing by an average of \$15 per month each year) and to a lesser extent with amount of education. Earnings were not significantly affected by field of specialization, industry in which engineers were employed, or geographical location. In general, administrative positions pay the highest salaries; production, research, and plant control pay less.

Surveys of other professions indicate that the earnings of members of professional societies tend to be higher than those for the profession as a whole. Therefore, the above earnings data do not represent the status of all ceramic engineers, although they do reflect the general pattern in the profession.

### *Where To Get More Information on Ceramic Engineering*

American Ceramic Society,  
2525 N. High St.,  
Columbus, Ohio.

## Chemists

(D.O.T. 0-07.)

### *Outlook Summary*

Good employment opportunities at present. In long run, opportunities will continue to be good for chemists with graduate training; those with only bachelor's degree may have difficulty obtaining professional jobs.

### *Nature of Work*

Chemists are trained primarily for laboratory research and development work relating to chem-

ical and physical changes in materials and products. Those who go into graduate work usually specialize in one of five main branches of chemistry and even in some field within a branch. Organic chemistry is the branch employing most people in the profession; it is concerned with the broad field of the carbon compounds. Inorganic chemistry deals with compounds not containing carbon, such as most of the minerals and metals. Physical chemistry, which deals in relationships between chemical and physical properties in chem-



ical compounds and mixtures, requires specific training also in physics and mathematics. Biochemistry is chiefly concerned with the effects of foods, drugs, and chemicals on plant and animal tissue. Analytical chemistry is the study of the methods, and the practice, of analyzing chemical compounds.

There are (in 1948) about 80,000 chemists in the country; 4 percent are women. The types of work in which the greatest numbers are engaged are analysis and testing, industrial research, teaching, and technical administration. Other major fields are production, development, research in basic science, and technical service.

### *Where Employed*

By far the largest number of chemists is employed in industry. Government, including Federal, State, and local, employs large numbers as do educational institutions, research institutes, public utilities, and consulting laboratory firms.

### *Training*

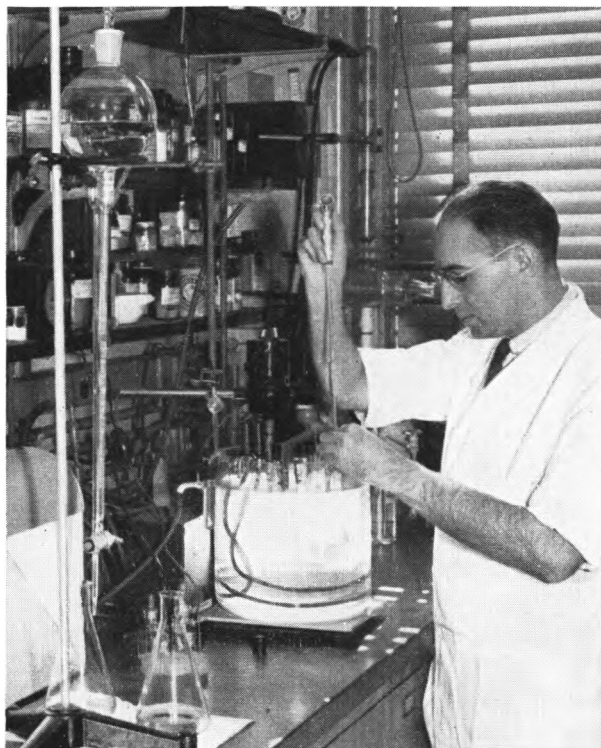
A bachelor's degree is usually the minimum requirement for new entrants. Advanced degrees are held by more than 40 percent of all employed chemists and are almost essential for research. In the period 1940-45, more than two-thirds of all the Ph. D. degrees granted in the physical sciences were awarded in chemistry. Over half the chemists teaching in colleges and doing basic research have the doctor's degree. Thorough training in a college or university of recognized standing is important in securing desirable employment.

### *Outlook*

Opportunities for properly trained chemists are very good. There is a shortage of scientists for basic and background research, developmental and applied research, and teaching. This shortage is chiefly the result of an increased demand brought about by the shifting of the main center of basic research to this country from Europe, the backlog of projects postponed during the war, and the greatly increased enrollments in colleges and universities. In industrial laboratories, where chemists represent 38 percent of the total number of scientists and research engineers em-

ployed, there are good opportunities for those with advanced degrees or specialized experience.

There are also employment opportunities at present for new entrants holding only the bachelor's degree. Entrance jobs are mainly in analysis, testing, and certain production jobs in manufacturing, and as laboratory assistants in research.



The chemist usually qualifies for basic research only after specialized experience or graduate training

There are good chances of advancement for those who take additional training or show unusual aptitude, but those without initiative often remain in routine jobs at low pay. There are some opportunities as graduate assistants in universities, where one may give part-time instruction to undergraduates at a monthly stipend of about \$100, while taking graduate work. Also numerous fellowships are available for those who wish to engage in graduate study.

Owing to the large number of young people taking training in chemistry, it will become increasingly difficult for those with only the bachelor's degree to secure jobs at the professional level. Present enrollments indicate that the annual number of graduates with the bachelor's degree in chemistry may be nearly double the prewar num-

ber during at least the next few years. While many of these graduates will go into other fields, such as the study of medicine, it still appears likely that competition for beginning positions as chemists will be very great.

In the long run, there will be expanding opportunities in the profession, particularly for chemists with advanced degrees or successful experience—assuming that general business activity continues at a high level. Industries have plans for further expansion of research facilities. National expenditures for research and development increased tremendously during the war and are still three times as high as prewar. There is evidence that there will be considerable further increase in Government-sponsored research. Total employment in the chemical manufacturing industries is also expected to remain well above prewar levels. Teachers will continue to be in demand, particularly those qualified to direct graduate work. In addition, there will be some openings each year owing to deaths and retirements, though the number of such vacancies is not large in this profession (about 1,000 a year).

The greatest number of employment opportunities will continue to be found in the Middle Atlantic and East North Central States where the chemical manufacturing industries are concentrated. New York employs the greatest number of chemists, with Pennsylvania and New Jersey next.

### *Earnings*

Chemists' income depends on the type of work in which they are engaged, the amount and quality of their educational background, and the amount of professional experience they have had, as well as their individual abilities. In general, administrative jobs pay the highest salaries; technical

service and industrial research pay more than analysis and testing or secondary school teaching. In 1943, according to a survey, holders of doctors' degrees typically earned 20 to 35 percent more than chemists with the same number of years in the profession who had only masters' or bachelors' degrees. Most beginners had monthly salaries of about \$170 to \$200 and earned about \$30 to \$50 extra for overtime work. Earnings of men with 10 to 12 years of experience averaged from \$230 to \$310 a month, depending on their educational background; earnings of those with 21 to 25 years in the field also varied widely with amount of education, averaging from \$300 to \$400 a month. Starting salaries in early 1948 were approximately as follows: With the bachelor's degree, \$200 to \$250; master's degree, \$250 to \$300; doctor's degree, \$350 to \$500.

### *Where To Go for More Information*

Information on schools, scholarships, and other subjects may be obtained from:

American Chemical Society,  
1155 16th St. NW.,  
Washington 6, D. C.

Information on earnings is given in the following publication:

U. S. Department of Labor, Bureau of Labor Statistics. *Factors Affecting Earnings in Chemistry and Chemical Engineering*. Bulletin No. 881, 1946. U. S. Government Printing Office, Washington 25, D. C. Price 10 cents.

Employment opportunities for women are discussed in the following publication:

U. S. Department of Labor, Women's Bureau, *The Outlook for Women in Chemistry*. Bulletin 223, No. 2, 1948. U. S. Government Printing Office, Washington 25, D. C. Price 20 cents.

*See also:* Chemical Engineers, page 68.

## Architects

(D.O.T. 0-03.10)

### *Outlook Summary*

Good prospects for fully trained and experienced persons in near future. Also some openings for new entrants, though competition for beginning jobs is likely to increase.

### *Nature of Work*

Most architects plan and design all types of buildings. However, some specialize in one or more of the major fields of architecture: Domestic (private residences, apartments, group housing, farm buildings), industrial (factories, powerhouses), commercial (banks, hotels, office buildings, clubhouses), institutional and public, transportation buildings, and miscellaneous structures.

Before designing a building, the architect first consults with his client on the purpose to be served, general style, size, location, cost range, materials criteria, and other characteristics desired. In planning the building he takes into consideration economy of lay-out and construction as well as appearance and efficiency. After preliminary drawings have been made and approved by the client, he prepares detailed working plans, specifications, and obtains estimates of cost. In addition, he usually arranges the construction contract, supervises the progress of the work, and certifies to the completion of the building.

### *Where Employed*

Most architects are in business for themselves or are employed by architectural firms. A few work for government agencies, construction contractors, and engineering firms, and teach in colleges and universities.

Members of the profession are found in all regions of the country, mainly in large cities. In 1940, over one-half were employed in the following seven States: New York, California, Illinois, Pennsylvania, Ohio, New Jersey, and Massachusetts.

### *Training and Qualifications*

A bachelor's degree from one of the recognized architectural schools is generally a minimum requirement for entrance into the profession. Most of these schools have 5-year courses. After obtaining a degree, the beginner usually starts as a draftsman in an architectural office and works up as his ability becomes recognized. A few people without formal training may enter the profession by acquiring many years of experience in architectural offices.

Licensure is required in practically all States for practice as an architect, where safety of life, health, and property is involved. Requirements for admission to the licensing examination vary from one State to another but generally include graduation from a recognized professional school followed by 3 or 4 years of practical experience (most States accept a very long period of experience as a substitute for graduation from an architectural school).

### *Outlook*

The demand for architects' services is much greater than before the war and will probably remain so in the near future—owing to the great amount of residential building and other construction which is being planned. In contrast, the supply of new graduates entering the field was far below the prewar level during and immediately after the war. Some of the large reserve of architects who left the profession before the war have re-entered since V-J-day, but not enough to fill the need. The outlook is therefore promising for trained personnel for some years to come. However, enrollments in architectural schools are now high. If they continue at present levels, future graduates will be confronted with increasing competition for jobs. New entrants should get the best possible training and experience to aid them in meeting the expected competition.

The long-run employment trend in the profession appears to be slowly upward. However, the demand for architects' services is dependent largely on the volume of building activity, and the construction industry has in the past been subject to marked ups and downs. In the thirties, when construction was at a low ebb, there was more un-

employment among architects than in many other professional groups.

#### *Where To Go for More Information*

American Institute of Architects,  
1741 New York Ave. NW.,  
Washington, D. C.

## Industrial Designers

(D.O.T. 0-46.88)

### *Outlook Summary*

Good employment opportunities for experienced and well-qualified persons; some openings for well-trained beginners. Field likely to expand in long run, but competition for jobs may become keener.

### *Nature of Work*

Workers in this occupation design the form or structure of a great variety of products, so that they will appeal to consumers and meet their needs. Products designed include automobiles, furniture, machinery, electrical appliances, ash-trays, fountain pens, and many others. The design is usually submitted in the form of a drawing or model, which is made according to a specific order or request.

Most designers either are in business for themselves, doing work for several manufacturers, or are employed by independent designing firms. In either case, one man may design widely different products, ranging even from toothbrushes to locomotives. Industrial designers may also be employed by big manufacturing plants, and as merchandising consultants or buyers for large retail or wholesale houses. Experienced persons can transfer fairly easily from one field or product to another.

### *Personal Qualifications and Training*

The industrial designer must have artistic ability, a knowledge of merchandising, and the technical skill to create products suited to modern production methods. A proper educational background, including training in applied art, the main branches of factory technology, mathematics and other technical subjects, business economics, and consumer psychology, is extremely important.

A few universities and technical schools have combined these courses into programs of study which may be completed in 3 or 4 years and lead to a degree or certificate in industrial designing.

A less frequent method of entry is through on-the-job training with established designers. In addition, men enter the field by transfer from drafting, commercial art, commercial designing, engineering, or other allied fields. However, in view of the variety of skills and knowledge essential for success, an integrated course of study at a college level is recommended. Before the beginner can get recognition as a full-fledged designer, he must have created design ideas that have proved successful.

### *Outlook*

Employment opportunities are likely to be good for qualified and experienced persons for at least the next few years. There will also be more openings than usual for beginners with good education and ability. One reason for this is that the number of well-trained persons entering the field decreased during the war; though the need for designers in war industries was great and many newcomers were therefore taken into the occupation, most of these had inadequate training and experience. In addition, the immediate future should bring an increased demand for the services of the industrial designer. Manufacturers are beginning to face a highly competitive market, and design will play an important part in this competitive selling.

The field is also likely to expand over the long run. It has developed as a separate occupation only within the past 20 years, and, despite rapid growth, is still rather small. Among the factors

which point to continued growth in opportunities for industrial designers is the prospect that war-time technological developments will be adapted more and more to peacetime uses and that new industries will spring up. Employment opportunities, however, vary considerably with changes in business activity. At the same time, competition for jobs may become keener if, as expected, more and more people take college training in industrial designing.

Employment opportunities will usually be found in large metropolitan areas, where most designing firms and industrial plants are located.

In 1940, the majority of industrial designers was employed in the Northeastern States.

### *Earnings*

Beginners, after training and some experience, generally received around \$50 per week in early 1947. A wide range of earnings exists among established designers; some working on a free-lance basis make upward of \$25,000 yearly.

### *Where To Get More Information*

Society of Industrial Designers,  
48 E. 49th St.,  
New York, N. Y.

## Tool Designers

(See D.O.T. 0-48.41)

### *Outlook Summary*

Favorable employment prospects both in the next several years and over a longer period for this relatively small occupation.

### *Nature of Work*

The tool designer originates and prepares sketches of the designs for special fixtures, cutting tools, and other attachments used on machine tools. These sketches are made into detailed drawings by draftsmen under the direction of the tool designer. The tool designer must have a practical and detailed knowledge of machine-shop practice, drafting, and the characteristics of the materials of which tools and fixtures are made. His duties include the developing of new tools as well as the redesigning and improving of tools currently in use. Particularly in the smaller shops, often the tool and die makers and machinists design and make new accessories for machine tools as part of their regular duties. Larger establishments, whose operations require frequent and complicated design of machine-tool accessories, employ tool designers who specialize in preparing the specifications which are followed in the machine shop.

### *Training and Qualifications*

There are several different ways in which to qualify as a tool designer. The most frequent

practice has been for tool and die makers and machinists to supplement their experience by special training in tool design, drafting, and mathematics, and then advance into tool design work. To move from machine-shop and tool-room work to tool design requires the ability to conceive the idea for a new tool that will fill a definite need in the machining operations and the knowledge of how to prepare a working design for its construction. Another method of qualifying is to serve a 4-year apprenticeship in tool designing of which machine-shop training should comprise at least 2 years. Another way is the completion of a 4-year college course in mechanical engineering plus additional practical experience in machine-shop work. Fewer persons have qualified by this method than by the other two. However, engineering graduates, with specialization in subjects related to tool designing, are likely to have greater opportunities to advance to broader and more responsible jobs in the field of tool engineering, which includes the selection, planning, and production of tools, as well as designing.

Some tool designers have started as draftsmen and acquired sufficient knowledge of machine-shop practice to advance to tool-design work.

### *Where Employed*

Most jobs for tool designers are in the engineering and designing departments of large manufacturing plants, especially those in the automobile,

machine tool, machinery, electrical equipment, and aircraft industries. Many of the companies in these industries have entire sections of their engineering departments devoted to tool design. Another frequent source of employment for tool designers is in the tool and product engineering companies which specialize in tool designing for other firms on a contract basis. These companies service mainly the automobile industry. A third and less important field of employment is in the independent tool and die shops. Many of these are relatively small and in them much of the designing may be performed by the tool and die makers or machinists. Where there is sufficient work to require specialized tool designers, only a small number of tool designers are usually employed in each shop. Tool designers are also employed in government-operated military and naval manufacturing establishments.

### *Outlook*

The employment outlook for tool designers is related mainly to trends in those metalworking industries which use mass production methods and in the tool and die shops and engineering firms

which service them. During the next few years, the automobile, machinery, and other metal working industries are expected to increase their machining operations in order to satisfy the strong demand for their products. The high level of machine-shop activity and the general trend toward more extensive tooling in machining operations will provide new opportunities for tool designers over a long period. In addition to the long-range trend toward greater use of special tools, jigs, and fixtures in machining operations, more and more plants that did not previously hire specialized tool designers have recognized their value and are beginning to employ them. The introduction of new products, as well as modification of older ones, frequently requires extensive retooling. This operation will also contribute to the demand for tool designers in the coming years.

### *Earnings*

No general recent data on the earnings of tool designers are available but earnings of fully qualified tool designers usually start around the rates for class A tool and die makers and range upward depending on the degree of skill and responsibility.

## Draftsmen

(D.O.T. 0-48.)

### *Outlook Summary*

Good prospects for well-trained and experienced persons; limited opportunities for beginners. Keen competition after several years, owing to large number in training.

### *Nature of Work*

Draftsmen make working plans and detailed drawings for engineering, construction, or manufacturing purposes. They generally work from sketches, specifications, or field notes furnished by an engineer, architect, or designer. Many types of drafting instruments are used, including compasses, T-squares, triangles, scales, and special drafting pencils and lettering pens.

A new draftsman usually starts as a tracer or copyist. From there, he may advance to detailer, junior draftsman, senior draftsman, and possibly head or chief draftsman. Workers in the higher

grade positions are required to make calculations concerning the strength, quality, or cost of materials; to use engineering handbooks and tables for computations; and to have still other skills.

From top drafting jobs, it is possible to advance to design and engineering positions, especially for men who obtain additional training in mathematics and science. Many graduates of engineering and architectural schools start their careers in the drafting room and can advance rapidly because of superior training. However, some of these graduates never achieve professional status.

Most draftsmen specialize in some particular field of work. The largest fields are architectural, structural, mechanical, aeronautical, electrical, marine, and topographical drafting.

### *Where Employed*

In the main, draftsmen are employed in the construction, machinery, iron and steel, automobile,

aircraft, and shipbuilding industries; by private engineering and architectural consulting firms; and in Federal, State, and local government agencies. Draftsmen are to be found in every State, even in small cities, but the greatest number work in the Northeastern and North Central States where most of the above-mentioned industries are concentrated.

### *Qualifications and Training*

Usually a person becomes a draftsman either by studying at a trade or vocational school and later acquiring practical experience, or by serving a 3- or 4-year apprenticeship, or by some other type of on-the-job training plus part-time schooling. In any case, the training received should include mathematics, physical sciences, mechanical drawing, standard methods of lettering, and tracing. Many of the higher grade jobs require knowledge of the techniques of the particular industry involved.

A draftsman must have certain personal qualifications, such as neatness, accuracy, good eyesight, manual skill, and a talent and liking for drawing in addition to technical knowledge.

Many of the top drafting jobs require knowledge of the techniques of the particular industry involved



### *Outlook*

Employment of draftsmen is expected to remain above the prewar level indefinitely but will probably not go as high as during the war for some years. The number employed in war industries, such as aircraft, shipbuilding, and machinery, have dropped sharply since VJ-day, but the number in the construction industry and with engineering and architectural firms have been rising. Owing to the large demand for all types of buildings, construction activity will probably continue to expand for several years and then remain at or near the peak level, unless there is a severe business depression.

Prospects are good for well-trained and experienced draftsmen in most parts of the country for the near future. Those with architectural or construction experience will have the best opportunities. However, the occupation tends to be overcrowded with inadequately trained workers. This is particularly true in war-production centers, where a great many sketchily trained workers were taken into drafting jobs during the war and laid off after VJ-day.

The occupation will probably tend to become overcrowded during the next few years, as the large number of persons now in training complete their apprenticeship or other training programs. Enrollments in closely allied professional fields, such as engineering, are also very high; the tendency toward overcrowding in these professional occupations will add to the competition for jobs over the long run. In addition, the construction industry has in the past been subject to marked ups and downs: If repeated in the future, these fluctuations will mean periods of reduced employment for draftsmen. Transfer to industries where opportunities exist will be easiest for persons with long experience and broad technical knowledge.

### *Where To Go for More Information*

American Institute of Architects,  
1741 New York Ave. NW.,  
Washington, D. C.

International Federation of Technical Engineers,  
Architects, and Draftsmen's Unions, A. F. of L.,  
900 F St. NW.,  
Washington, D. C.

*See also:* Architects, page 77; Civil Engineers, page 63; Mechanical Engineers, page 67.

## Meteorologists

(D.O.T. 0-35.68)

### *Outlook Summary*

Current shortage of qualified meteorologists, which is likely to become less in next few years. Some expansion in employment in long run, but this will never be a large profession.

### *Nature of the Work*

Meteorologists study and prepare reports on weather conditions. They make weather forecasts covering particular localities or regions, for the use of aviation and other transportation industries, manufacturers, and farmers, as well as the general public. They may also do research on weather conditions in a particular area over a long period of time and on such problems as causes of thunderstorms or hurricanes, creating artificial rain or snow, long-range forecasting, or new types of recording instruments. Those men concentrating on forecasting work are frequently known as weather forecasters. In small stations, the meteorologists may make the weather observations, besides handling other duties.

### *Where Employed*

The United States Weather Bureau is the principal employer of meteorologists in this country; about 1,200 of the total of 1,500 civilian meteorologists employed at the beginning of 1948 were on its staff. Others are or work for private weather consultants, teach or do research in the universities, or work for the commercial air lines. In addition, a considerable number are in the armed forces. There are very few women in the profession.

### *Training*

For a position as a professional meteorologist, a college degree in meteorology, along with considerable work in mathematics and physics, is increasingly important, though many present meteorologists gained their skill mainly through experience. Graduate work is also becoming more and more helpful. Many universities give one

or two courses in meteorology, but there are only about half a dozen which offer the opportunity to major or obtain graduate degrees in meteorology. Of those men trained by the armed forces during the war, the ones who completed certain college courses (the "A" course or its equivalent) as part of their training are generally considered best prepared. For workers already employed by the Weather Bureau, there is an in-service training program which offers every year a few scholarships at certain universities to help outstanding workers complete their professional education.

In addition to academic training, practical work experience as a weather observer (see p. 84) will be valuable to the young meteorologist. Some promising meteorology students can obtain jobs with the United States Weather Bureau during the summer after their junior year under the student-aid program; those accepted under this program are guaranteed professional jobs with the Weather Bureau upon graduation.

### *Outlook*

Job prospects for the trained men are good now. Although thousands of men received some training in meteorology while in the military service, only a small proportion continued in the field. Even so, hundreds applied for jobs immediately after the war, but most of them could not be absorbed immediately by either the Government or other employers. Those not hired generally turned to other kinds of work; some went to the universities for further training. As a result, the labor surplus dwindled away. By the end of 1947 there was some shortage of qualified workers. This shortage will be relieved to a considerable extent in the next few years as the 300 people now taking undergraduate or graduate training complete their courses, but the profession does not anticipate any problem of overcrowding.

In the long run, total employment will rise slowly, assuming a continuing high level of business activity, though this will remain one of the



smaller professions. The expected gradual expansion of civil aviation will tend to raise the number of meteorologists needed by the Weather Bureau and the air lines. In addition, the air lines will probably employ slowly increasing numbers of men with some meteorological training in dispatcher or other jobs. Private consultant services furnishing weather data to meet the client's particular business needs offer another new and growing field of opportunity for enterprising meteorologists. Other scientific fields—such as radio physics, particularly television—are requiring more and more meteorological information. The expanding demand for meteorologists will in turn stimulate some slight growth in the teaching and research staffs at the universities. In the long run, there will be some openings owing to turn-over in personnel, but the main source of new jobs will result from expansion of the profession, since meteorology is relatively new as a formalized science and the people in the field are predominantly younger men.

Opportunities for women in this work will probably continue to be rather limited. Best chances for employment are likely to continue to be at women's colleges, teaching courses in meteorology

Meteorologist interprets data which has been picked up by the receiving apparatus of the radiosonde

COURTESY OF U. S. WEATHER BUREAU



along with other scientific subjects. A few positions in the Weather Bureau are especially suited to women.

### *Earnings and Working Conditions*

In the Weather Bureau, salaries of professional meteorologist start at about \$2,950 a year. Most experienced men earn between \$3,730 and \$5,230 a year. Those with supervisory, administrative, or executive duties get annual salaries ranging from \$5,000 up to \$10,000. Overseas jobs carry a 25-percent bonus.

Meteorologists working for the commercial air lines earn between \$2,400 and \$5,500; those working in overseas stations get additional bonuses; those who have advanced to executive positions may get anywhere from \$4,000 to \$10,000 a year. At the universities, salaries for teachers range from \$2,400 to \$7,000; administrative or executive officers earn from \$5,000 to \$10,000. Meteorologists who run their own consulting services appear to have the widest range of earnings—anywhere from \$2,400 to \$12,000 a year.

Many Weather Bureau jobs involve night work, frequently on rotating shifts, since stations are operated on a 24-hour basis. Although most stations are located at airports or other places in or near large cities, there are some posts in very remote and isolated spots. Some civilian jobs are located outside continental United States of America in such places as Alaska, Wake Island, Guam, Hawaii, the Philippines, Puerto Rico, or Iceland.

These people have unusually steady employment and stable earnings, paid vacations, sick leave, better-than-average pensions, and other benefits.

### *Where To Go for More Information*

For general information on the profession, one may write to:

American Meteorological Society,  
5 Joy St.,  
Boston 8, Mass.

This organization has published a pamphlet, *Weather Horizons*, which gives a detailed summary of job opportunities.

The United States Weather Bureau, Washington 25, D. C., should be consulted directly for information on positions with that agency, as well as on the student-aid program.

## Weather Observers

(D.O.T. 0-66.88)

### *Outlook Summary*

Employment prospects good for next few years. Some expansion in employment likely in long run.

### *Nature of Work*

These workers' main job is to make weather observations, using instruments which measure temperature, humidity, atmospheric pressure, wind direction, or wind velocity. They may also plot the data on weather maps, draw weather charts, and keep weather records. Often they answer inquiries as to the weather and handle other duties, under the direction of the professional meteorologists at the station.

Of the 2,700 weather observers employed at the end of 1947, about 2,300 were in the United States Weather Bureau. The others worked for universities and private forecasting services. A few employees of the Civil Aeronautics Administration take weather observations in addition to their other duties; these people must pass an examination in meteorology given by the Weather Bureau.

### *How To Enter*

High school graduation, with courses in mathematics and science, or 1 year of experience in weather observing is the minimum requirement for jobs in the Weather Bureau. Some college training in the physical sciences is desirable. Some newly graduated persons with degrees in meteorology take weather-observer jobs at first, to gain valuable practical experience. Veterans who have had weather-observer training in the armed forces receive special preference for jobs.

The United States Weather Bureau operates an in-service training program for its employees and also offers a few scholarships each year at leading universities to help outstanding workers complete their professional education.

### *Outlook*

Job opportunities are good in this occupation at the present time (early 1948) and are expected to

remain so in the near future. For some months after VJ-day, there were a tremendous number of veterans and others seeking work, trying to make use of the weather training they had received during the war. At that time, there was room for only a few of these people in civilian weather-observer jobs. The rejected applicants soon went into other types of work, and by late 1947, a labor shortage had developed which is expected to continue for a short time. A considerable number of openings have arisen owing to expansion in Weather Bureau employment and to turn-over, which has been higher than usual because of the termination of temporary wartime appointments.

Over the long run, there will be a moderate increase in employment, reflecting expansion of Weather Bureau services, especially to aviation. This will never be a large occupation, however.

Opportunities for women in this occupation are not numerous. During the war a good many were employed by the Weather Bureau, but the number has dropped considerably since then.

### *Earnings*

In the Weather Bureau, observers with minimum qualifications start at about \$2,500 per year. People with more training or experience may begin at somewhat higher rates. Overseas jobs carry a 25-percent bonus.

Many of the Weather Bureau jobs are located in or near large cities, often at the local airport. However, some of the weather observatories are in remote and isolated spots; a few are outside continental United States in such places as Alaska, Iceland, Puerto Rico, Hawaii, Wake Island, Guam, or the Philippines.

Since weather stations operate on a 24-hour basis, observers often have to do night work; frequently they are on rotating shifts. These people have unusually steady employment and stable earnings, paid vacations, sick leave, better-than-average pensions, and other benefits.

*Where To Go for More Information*

For general information write to:

American Meteorological Society,  
5 Joy St.,  
Boston 8, Mass.

This organization has published a pamphlet entitled "Weather Horizons," which gives a detailed résumé of job opportunities in both the Federal Government and private industry.

People interested in employment with the United States Weather Bureau should get in touch

with the nearest of the seven Weather Bureau regional offices, which are located in New York, N. Y.; Atlanta, Ga.; Chicago, Ill.; Kansas City, Mo.; Fort Worth, Tex.; Los Angeles, Calif.; and Seattle, Wash. For employment outside continental United States, the Weather Bureau office in Washington, D. C., should be consulted. Information on employment opportunities for meteorology students, through the Student Aid Program, may also be obtained from the United States Weather Bureau in Washington.

## Radio Operators (Telephone and Telegraph Industry)

(D.O.T. 0-61.25, .33, and .36)

*Outlook Summary*

Small field of employment. Very few job openings expected.

*Nature of Work*

A few major companies which specialize in providing the public with radiotelegraph and radio-telephone service and which operate shore stations for communicating with ships at sea employ most of the workers covered in this statement. There are also a number of smaller companies in this field.

There are two main groups of workers, radio operators and radio operating technicians. The radio operators transmit and receive radiotelegraph messages in continental Morse international code, mostly to and from overseas points and ships at sea. They use both semiautomatic and manually operated equipment and must meet the company's minimum requirements with regard to speed in receiving and transmitting messages. They need little technical knowledge of radio. The Federal Communications Commission does not require licenses for this group.

The radio operating technicians adjust, maintain, and repair the actual transmitting and receiving equipment. Their jobs are similar to those of transmitter operators in the radio broadcasting industry. They must have first or second class radiotelephone or radiotelegraph licenses issued by the FCC. Requirements for licenses include

United States citizenship; passing a written examination on communications law, radio theory, and related subjects; and, for radiotelegraph licenses, passing a speed test in receiving and sending code messages.

*Outlook*

This is a small field, offering extremely limited employment opportunities. About 1,000 radio operators and about 500 radio operating technicians were employed in early 1947, including those working outside the continental United States.

Employment of high-speed manual operators will probably decline. The volume of radiotelegraph and radiotelephone traffic is increasing, but teletype, multiplex, and other automatic machines are gradually replacing manually operated equipment. With the shift to automatic equipment, fewer and less-skilled workers will be needed to handle the same amount of traffic.

Opportunities for radio operating technicians will be somewhat better than for high-speed manual operators. Even for technicians, however, there will be little expansion in employment and few openings owing to turn-over.

*Earnings and Working Conditions*

For radio operators in continental United States hourly wage rates in late 1947 ranged roughly between \$1.20 and \$2. The range was even wider

for radio operating technicians—\$1.20 to \$2.25 per hour. Hours of work for both groups averaged a little less than 40 per week.

Most workers in these occupations are members of the American Communications Association, CIO.

## Ship Radio Operators

(D.O.T. 0-61.33)

### *Outlook Summary*

Job prospects poor. Employment higher than prewar but far below wartime levels and still declining.

### *Nature of Work*

Ship operators stand watch in the radio room, to receive incoming messages in Morse code and transmit any outgoing ones. They keep records of messages handled and must be familiar with code books and radio channels. They also make adjustments in the receiving and transmitting equipment to give the clearest possible reception, and take care of routine repairs. In addition, operators are responsible for other types of electronic equipment aboard, such as radio direction finders. On a minority of ships and for extra pay, they perform clerical tasks not related to their regular duties. Like other members of the crew, they take part in shipboard emergency drills.

### *Where Employed*

Oceangoing vessels of more than 1,600 tons, including those engaged in coastwise traffic, all carry radio operators. The great majority of ship operators are on cargo vessels, but a hundred or so are on oceangoing passenger ships. A much smaller number still are on Great Lakes passenger vessels. Cargo vessels operating exclusively on the Great Lakes do not usually have radio operators; these ships have only radiotelephone equipment, which is usually operated by the captain or other ship's officer.

### *Qualifications*

Men serving as ship operators must hold first- or second-class radio telegraph licenses issued by the Federal Communications Commission.

To qualify for a second-class license, an applicant must pass a written examination covering basic communications law and radiotelegraph theory and practice, and must demonstrate ability to transmit and receive Morse Code at the rate of 16 code groups per minute. For a first-class license, an applicant must have more advanced knowledge and be able to transmit and receive 20 code groups per minute and 25 words per minute, plain language. In addition, to obtain a first-class license, one must be at least 21 years of age and have had at least 1 year of experience.

To serve on a ship carrying only one operator or act as chief operator, holders of second-class licenses must have had at least 6 months' experience. Occasionally, when men qualified to be sole operators are not available at certain ports for ships ready to sail, the Federal Communications Commission waives the latter requirement.

Hiring is most often done through the Marine Engineers Beneficial Association (CIO) or the Radio Officers Union (AFL); practically all ship operators belong to one of these two unions.

### *Outlook*

Employment prospects are poor. At the peak during the war, there were about 3,900 ships with radiotelegraph licenses, most of which carried at least two radio operators. In early 1948 there were fewer ships (around 2,200), and the large majority carried only one operator (passenger ships carried enough to maintain a continuous watch). It is expected that the number of operators employed will continue to decline as the number of active ships decreases, unless measures are taken to maintain or enlarge the merchant marine. Eventually, many men who consider themselves ship radio operators will have to seek other fields of employment.

*Earnings and Hours of Work*

Operators on cargo ships, by far the largest group, receive base pay of around \$280 per month, plus overtime for holiday and Sunday work. Additional overtime work is common, so most operators earn more than the base rate. In general, operators on the relatively few passenger

ships are paid higher base rates. Operators receive board and room free of charge aboard ship and are given paid vacations.

*See also:* Flight Radio Operators, page 88; Ground Radio Operators (Aviation), page 90; Radio Operators (Broadcasting), page 87; Radio Operators (Telephone and Telegraph Industry), page 85.

**Radio Operators (Broadcasting)**

(D.O.T. 0-61.10, .16, .17, .30, .40, and .50)

*Outlook Summary*

Expanding field of employment; many openings expected in near future. More licensed personnel seeking work than there are jobs in many urban areas. Best chances for jobs in small communities. Excellent prospects for men especially trained in television.

*Nature of Work*

Groups covered are (1) transmitter operators employed by radio networks and individual broadcasting stations to operate and maintain transmitters and related equipment; (2) studio operators who are responsible for the arrangement and operation of studio equipment, including operation of volume controls during broadcasts; and (3) maintenance men.

*Training and Qualifications*

Transmitter operators and maintenance men are required to have first-class radio-telephone licenses from the Federal Communications Commission. No license is needed for studio-operator work, but many men in this job have licenses, since they often have to handle transmitter or maintenance work. To obtain a license, one must be a citizen and must pass an examination requiring knowledge of mathematics, basic radio theory, advanced radio telephony, and FCC regulations. Employers often set up additional requirements with regard to experience and formal education.

Television operators must have an unusually high degree of skill and technical knowledge and must undergo on-the-job training. Some trainees are selected from among the AM and FM men;

others come directly from the better radio and television schools.

*Outlook*

By early 1948 about 2,000 AM and FM stations were operating and around 1,000 more had been authorized. When the authorized stations are completed it is estimated employment of licensed operators will be around 15,000, as compared with around 10,000 presently employed. This means that there will be several thousand job openings at new stations in the near future, in addition to openings at established stations. Operators customarily move from low-power to high-power stations as they gain experience, thus creating openings for new men at the small stations. Men will also tend to move from AM-FM to television jobs.

Television is in its infancy but appears to be entering a period of rapid growth. In early January 1948 only 17 television stations were operating, but about 60 more had been authorized and this number was expected to increase steadily. Since a station of this type required a sizable number of operators (many more than the average AM or FM station), hundreds of specially trained television men are likely to be needed within the next year or two.

Over the long run, a continued upward trend in employment of technicians is expected. The number of television and FM stations will go on rising for many years. In urban areas, AM broadcasting will probably give way increasingly to FM. But sparsely settled regions will no doubt continue to be served by AM stations, unless methods are discovered for extending television and FM reception beyond the present limit of about 50

miles (the distance from the antennae to the horizon). In any case, losses in employment which may occur as AM channels go off the air will probably be offset by gains in television and FM, unless there should be a depression. Even in that event, employment would be likely to decline less in this occupation than many others.

Despite expanding employment, the number of licensed men seeking work is greater than the number of openings in many areas, especially large cities. At the same time, there are good opportunities in other areas, particularly in small communities. Highly skilled television men are needed in cities with television stations and will be in demand in many additional cities in the near future.

The number of men seeking operator jobs may be further increased if the FCC should make certain proposed changes in its licensing requirements. These changes would permit many small AM and FM stations to hire operators for non-supervisory jobs who had passed a less difficult examination than is now required for licenses.

#### *Earnings and Working Conditions*

Average earnings of full-time transmitter operators at stations with 15 or more employees were about \$66 a week in October 1947, according to an FCC survey. Studio operators without licenses averaged about \$77 a week; those with licenses about \$80; chief engineers and supervisors of engineers \$101. Supervisory and nonsupervisory technical employees of stations with less than 15 employees averaged \$54 per week, much less than any of the groups employed by the bigger stations. Operators and engineers were scheduled to work an average of between 40 and 41 hours per week in the stations with 15 or more employees. Aver-



Left, radio operator controls television transmission; right, sound operator

age hours of work in the smaller stations were longer, about 43 per week. Principal unions organizing operators are the International Brotherhood of Electrical Workers (AFL), the National Association of Broadcast Engineers and Technicians (independent), and the American Communications Association (CIO).

#### *Where To Go for More Information*

Local unions of radio operators can provide information on employment opportunities, wages, and working conditions. Some broadcasting trade magazines carry advertisements asking for radio operators.

See also *Flight Radio Operators*, page 88; *Ground Radio Operators (Aviation)*, page 90; *Ship Radio Operators*, page 86; *Radio Operators (Telephone and Telegraph)*, page 85.

## Flight Radio Operators

(D.O.T. 0-61.32)

### *Outlook Summary*

Few job opportunities expected in this small occupation. Oversupply of experienced workers is great and will continue to be so indefinitely.

### *Duties*

Flight radio operators (also known as flight communications officers or flight radio officers) are now employed almost exclusively in airline opera-

tions over international routes. Their duties may include obtaining radio bearings, sending and receiving weather information and other messages in International Morse Code, operating radio-navigational equipment, and listening in on the international distress-signal frequency twice an hour at the prescribed times. They make all needed adjustments and emergency repairs on radio equipment while in flight or at stops where no radio maintenance man is available. They also inspect and test the equipment between flights.

### *Qualifications*

Every flight radio operator is legally required to have a Federal Communications Commission radiotelegraph operator license of second class or higher and a Civil Aeronautics Administration airman certificate. To obtain the former, one must show a comprehensive technical knowledge of radio and meet other requirements. The latter certificate is issued to persons demonstrating ability to perform the duties of the occupation. As in the case of other members of flight crews, appearance and personal characteristics of applicants are emphasized in filling vacancies, and strict physical examinations must be passed to enter and stay in the occupation. Frequently, job openings are filled by promotion of ground radio operators.

### *Outlook*

This is a very small occupation. No more than two or three hundred were employed in early 1948. Expanding overseas air-line operations and other developments may lead to some openings, especially if general business activity remains at a high level. Under the most favorable conditions, however, employment is not likely to increase by much between now and 1950 and openings due to turn-over will be very few. In the long run, the numbers employed will not rise as fast in this occupation as air-line jobs generally; they may even decrease. Among the factors which will tend to keep down the number of flight radio operators are the prospective establishments of more and more international airways with radio-range beams and other aids to navigation like those now used in this country and the increasing application of radar to civilian air transportation. On

the favorable side is the fact that the utmost consideration will always have to be given to adequate ground maintenance, servicing, and repair of whatever electronic equipment is used on planes. However, it is more accurate to view this as a factor in providing substitute employment rather than one affecting employment of flight radio operators as such.

First in line for any vacancies which may occur in the near future are the experienced operators whom the air lines have had to lay off during the past year and who are now on furlough. Next come the ground radio operators who are eligible for promotion. In addition, some of the great number of men who were flight radio operators in the armed services continue to seek comparable civilian jobs. Persons trained for other kinds of radio operator work make up a still greater number of potential eligibles. All in all, there tend to be more interested and qualified men available than there are job opportunities; newcomers have practically no chance for employment. This will continue to be the picture for some time to come, despite the planned Air Force expansion. But men qualified for this work may be able to compete successfully for jobs in a great variety of expanding fields involving their basic skills.

### *Working Conditions*

Flight radio operators are paid monthly salaries. A very rough estimate suggests that their annual take-home pay averages in the neighborhood of \$5,000; that most men are paid between \$300 and \$500 monthly. Factors affecting earnings include length of service and whether the employee is a junior or senior operator.

Flight-time averages under 85 hours a month and probably never exceeds 255 hours a quarter. However, a few additional hours monthly must always be spent in ground duties. A month's vacation with pay is commonly given.

As a rule, flight radio operators are on duty away from base about half the time. When they are working away from home their living expenses are paid by the employing air line.

### *Where To Get More Information*

Additional information on the occupation of flight radio operator is given in:

U. S. Department of Labor. Bureau of Labor Statistics. Employment Opportunities in Aviation Occupations, Part I—Postwar Employment Outlook; Part 2—Duties, Qualifications, Earnings, and Working Conditions. Bulletins Nos. 837-1 and 837-2. (1945 and 1946.) U. S. Government Printing Office, Washington 25, D. C. Price 10 cents and 20 cents.

Inquiries in regard to job openings should be sent to the personnel managers of the lines. Addresses are listed in part II of the bulletin just mentioned, or may be obtained from the Air Transport Association of America, 1107 Sixteenth Street NW., Washington, D. C.

*See also* Ground Radio Operators, page 90; Ship Radio Operators, page 86.

## Ground Radio Operators and Teletypists (Air Transportation)

(See D.O.T. 0-61.33 and 1-37.33)

### *Outlook Summary*

Only limited numbers of openings each year for some time to come; total new hires will probably not exceed a few thousand between 1948 and the early 1950's. Marked competition for jobs in some areas. Long-run employment trend upward for group as a whole.

### *Nature of Work*

Ground radio operators and teletypists are employed both by air lines, domestic and international, and by the Federal Airways Service of the Civil Aeronautics Administration.

Radio operators working for air lines send and receive messages between flight crews and ground personnel and between different points on the ground, using radiotelephone, radiotelegraph, or both. Air-line ground communications are also handled by teletypists, who operate a machine with a keyboard much like that of a typewriter. The radio operators and teletypists employed as aircraft communicators by CAA collect and relay information on weather conditions and other matters affecting flights.

The jobs are widespread geographically, with some workers located in the Territories and foreign countries. Air-line personnel work mostly at airports near metropolitan areas; CAA communicators are at stations scattered along the airways, often in remote places.

### *Qualifications and Advancement*

For radio-operator positions with air lines, applicants must usually have at least a second-class

radio-telephone or -telegraph license from the Federal Communications Commission, be able to type, and have specified educational and other qualifications.

To qualify for trainee positions as CAA aircraft communicators, applicants must meet Civil Service requirements, including at least 1 year in aeronautical communications work or other specified experience. All permanent appointments to CAA jobs are made on the basis of competitive civil-service examinations. Pending the holding of such examinations, hiring is done directly by CAA, and successful applicants are given only temporary appointments.

### *Outlook*

Radiomen and teletypists together make up a fairly large occupational group, as aviation occupations go. The number on public or private pay rolls may now (early 1948) be as high as 10,000 or more. Gains in air-line employment were heavy during 1946 and early 1947, but there was a "shake-down" in domestic operations during the rest of the latter year. Only moderate rises in private employment may be expected for the immediate future at least; even such growth depends upon continued vigor in the economy as a whole.

CAA communications activity has increased sharply in the postwar period, but employment has not risen proportionately. At the end of the war, August 1945, there were about 3,700 aircraft communicators working for CAA; a year later, 4,500 or thereabouts; in early 1948 only 4,200 or so. Future employment levels will depend on congressional appropriations for this activity; there is



reason to believe that more communicator jobs may be authorized. At present, job chances are particularly good for persons willing to work in Alaska and other places outside continental United States.

In the field as a whole, both public and private, job openings are not expected to exceed a few thousand through the early 1950's, including vacancies arising from quits, discharges, retirements, and deaths. Longer-run prospects differ as between radiomen and teletypists.

Although great strides have already been made in the substitution of teletype and related types of automatic equipment for radio facilities, this tendency is likely to continue, as are efforts at other technological improvements. One of the resulting developments is to decrease the need for radio operators (generally men) and increase the relative need for teletypists (usually women). On the other hand, the best of the former tend to gain in opportunities for promotion (to supervisory positions, for example) as communications activity and staffs grow and spread out from the present centers. Another factor favorable to the prospects for advancement of radiomen is the increasing complexity of communications systems, techniques, and equipment and the vital role which communication development—for instance, radar—plays in the drive for all-weather flying, safety, and economy.

On the labor-supply side, the potential surplus of qualified applicants, especially radio operators, is large, and hiring of newcomers is very spotty. During the war, well over 100,000 men and some women had varying amounts of radio-operator training and experience in the military and naval air forces alone. Relatively few of the wartime trainees have applied for jobs in this field. Nevertheless, the number of interested eligibles has been great enough to make for marked competition, at least in some parts of the country. This situation is likely to persist indefinitely despite the planned Air Force expansion. But some of the more skilled and experienced radiomen may be able to compete successfully for jobs in a great

variety of expanding fields involving their basic skills.

### *Earnings and Working Conditions*

For air-line radio operators, typical earnings range from \$170 to \$270 a month; for teletypists, about \$145 to \$215 a month. The salaries of CAA aircraft communicators range from \$2,498 to \$4,480 and better a year. Air-line personnel usually get 2 weeks' paid vacation. CAA employees receive 26 days of paid annual leave. The basic work-week is 40 hours both with the air lines and with CAA.

A number of lines have union agreements covering radio operators and teletypists. Organizations involved include the Air Line Communications Employees Association (American Communications Association, CIO), and the Radio Officers Union (Commercial Telegraphers Union, AFL).

### *Where To Get More Information*

Additional information on the occupations of ground radio operators and teletypists is given in:

U. S. Department of Labor, Bureau of Labor Statistics, Employment Opportunities in Aviation Occupations, Part I—Postwar Employment Outlook and Part 2—Duties, Qualifications, Earnings, and Working Conditions. Bulletins No. 837-1 and 837-2. (1945 and 1946). U. S. Government Printing Office, Washington 25, D. C. Price 10 cents and 20 cents.

Inquiries in regard to job openings on air lines should be sent to the personnel managers of the lines. Addresses are listed in part II of the bulletin just mentioned, or may be obtained from the Air Transport Association of America, 1107 Sixteenth Street NW., Washington, D. C.

For information regarding CAA positions, address the Civil Aeronautics Administration or the Civil Service Commission, Washington 25, D. C., or any regional office of either agency.

*See also* Flight Radio Operators, page 88; Ship Radio Operators, page 86.

## Airplane Pilots

(D.O.T. 0-41.10)

### *Outlook Summary*

Overcrowded occupation; only most highly experienced and qualified men likely to get jobs for some years. Continued growth in employment expected in long run.

### *Nature of Work*

Practically all pilots work either for the scheduled air lines or in general flight operations (non-scheduled flying and related activities). Those with the air lines fall into two main groups, captains and copilots.

Besides operating the controls of the plane, airline pilots have to keep close watch on a multitude of instruments, operate the voice radio, and handle other flight duties. They also have extensive ground duties—among them, studying weather reports, preparing flight plans, making a preflight check of the condition of plane, and filling out reports. The captain decides how work shall be divided between himself and the copilot, who acts as his assistant, and is regarded as a “captain in training.” On a small but growing number of flights, particularly on international routes, two pilots are carried in addition to the captain. Increasingly, pilots, are also serving as flight engineers (see p. 204).

Outside the air lines, pilots have a wide variety of jobs. Large numbers work for flying schools and commercial flying businesses (charter transportation, aerial photography and advertising, crop dusting and spraying, demonstration selling, and other activities). Some are employed by oil companies and other firms using planes for business purposes; a few by Government agencies (chiefly the Civil Aeronautics Administration) and by aircraft manufacturers. Many operate their own businesses, with or without paid help.

Air-line pilots are stationed at a limited number of “division” points throughout the United States; a few are based in foreign countries. Other pilots are located in all parts of the country where there are airports.

### *Qualifications and Advancement*

Every person who pilots a plane for pay is legally required to hold a CAA pilot certificate with a rating of commercial grade or higher. A pilot doing instrument flying must have an instrument rating. To operate a voice radio transmitter, he must ordinarily have an FCC aircraft radio-telephone operator authorization. Finally, an airline captain must have a CAA air-line transport pilot rating. For all ratings, there are strict requirements regarding physical condition, which is checked periodically. Pilots serving also as flight engineers must meet the separate standards set for this position (see p. 204).

In hiring pilots, employers—especially the air lines—insist on far more flying time than is specified in the legal requirements. They generally demand a high-school education or better (heavy preference is given men with college credits), and will hire only young men. Personality, temperament, appearance, and height (tall men are preferred) are also considered. For CAA positions, long and varied flying experience, as well as specified pilot ratings, is required.

The scheduled air lines hire only men as copilots. Those who make good are given a chance, on a seniority basis, to qualify for promotion to captain. At least 2 years' experience is generally needed to qualify for such upgrading; it may be 4 or 5 years or longer before a copilot is actually reached for promotion. Men failing to qualify as captains within a reasonable time are not retained as copilots. Captains may be promoted to chief pilot, assistant superintendent of flight operations, and other executive positions on up the ladder.

All CAA positions are civil-service jobs. At present (early 1948), they are being filled on a temporary basis only, without competitive examinations.

### *Outlook*

Employment of pilots is likely to rise moderately both in the near future and over the long run.

Around 10,000 pilots held jobs at VJ-day or about the same number as in 1940. A sharp war-time increase in the number on air-line pay rolls (from 2,300 at the end of 1940 to 4,500 or more by mid-1945) was offset by declining employment in other aviation services. During the first year after the war, employment increased rapidly on the air lines and elsewhere, only to fall off in 1947, particularly in scheduled domestic operations. The scheduled air lines started 1948 with a staff of about 7,000 pilots and copilots; the number employed in other fields was maybe half again as great.



Captain and copilot making a preflight cockpit check on a four-engine plane.

Continued growth in air-line traffic, notably freight traffic, and in a great variety of other aviation businesses—some already established, some new and untried—may be expected to lift employment only moderately in the immediate future. The net increase is not likely to be more than several hundred, at best, during any one year through 1950. The really great expansion in air-line employment would appear to be still some years ahead, waiting on the development of regular, all-weather flying. On the other hand, the increased size and speed of new planes, used as replacements and additions, permit given volumes of traffic to

be handled by fewer planes and pilots. In both the short and long run, growth in air traffic and employment will depend on continued high levels of general business activity.

Considerable competition for any pilot jobs (but not necessarily pilot-engineer positions) that arise is anticipated for some years. There were many pilots on furlough as 1947 came to a close. Although only a small proportion of the host of pilot veterans have sought flying jobs, the number doing so has been much greater than the number of openings—and there are other men with flight training and experience in the market for jobs. CAA commercial license approvals have dropped sharply since the first postwar year, but the number of men getting these ratings is still much greater than the number of openings. Even highly qualified applicants will be more numerous than vacancies for a year or two, and probably longer. Men with no flying history will have great difficulty getting into the field for several years. The 70-group Air Force program will scarcely affect the picture.

#### *Earnings and Working Conditions*

Highest paid are air-line captains, with monthly earnings ranging from about \$700 to \$1,000 or more, depending on flight time, size of plane, length of service, and whether the flying done is domestic or overseas. Air-line copilots make about half that much. At least one line pursues a policy, by union agreement, which tends to set a floor on pilot earnings; it guarantees 70 hours of flight time a month.

The average flight time of pilots with the scheduled air lines is somewhat greater than this minimum, though not more than 80 hours or so a month. The permissible maximum is 85 hours a month in domestic flying, 255 per quarter in international. Many hours of ground time substantially lengthen these work schedules.

The Air Line Pilots Association, AFL (the only collective-bargaining agency for pilots) states that “while earnings are in upper-earnings brackets, the earning period of an air-line pilot is comparatively short.” This it attributes to “the slowing up of physical and mental reflexes, coupled with stringent periodic physical examinations” which tends to ground most men before they reach the age of 45 years.

Pilots in other types of private employment have earnings nearer to those of copilots than to those of captains. They tend to have many more flight hours and irregular work schedules. CAA inspectors start at an annual salary of \$4,855, for a 6-month training period. After several promotions and many years of service, their salaries may reach as high as \$6,200 or more. The basic work-week is 40 hours, but actual work time is irregular.

In domestic air-line flying, a 2 weeks' vacation with pay is generally allowed; in international operations, a month's paid vacation. CAA pilots, like most other Federal employees, receive 26 days of paid annual leave per year.

As a rule, air-line pilots are on duty away from their base about half the time. When away, they have their living expenses paid by the air line.

Virtually all air-line—but few, if any, other—pilots belong to the Air Line Pilots Association.

#### *Where To Get More Information*

Additional information on the occupation of pilots is given in:

U. S. Department of Labor. Bureau of Labor Statistics. *Employment Opportunities in Aviation Occupations, Part I—Postwar Employment Outlook: Part 2—Duties, Qualifications, Earnings, and Working Conditions*. Bulletins Nos. 837-1 and 837-2 (1945 and 1946). Price 10 cents

and 20 cents. U. S. Government Printing Office, Washington 25, D. C.

To find out about openings with air lines and the exact qualifications needed, one should write to the personnel managers of the lines. Addresses are listed in part II of the bulletin just mentioned or may be obtained from the Air Transport Association of America, 1107 Sixteenth Street NW., Washington, D. C.

Men interested in setting up their own aviation businesses should consult State aviation commissions and local chambers of commerce; also the following publication:

Department of Commerce, Bureau of Foreign and Domestic Commerce. *Opportunities for Establishing New Businesses in Aviation*, Superintendent of Documents, Washington 25, D. C. (1948). Price 40 cents.

Information as to locations of air fields, repair stations, and flying schools can be obtained from the Office of Aviation Information, Civil Aeronautics Administration, Washington 25, D. C. For information regarding Federal Government positions, address the United States Civil Service Commission, Washington 25, D. C., or any regional office of this agency.

*See also* Dispatchers and Assistants, page 114; Airport and Airway Traffic Controllers, page 116.

## Navigators (Air Transportation)

(D.O.T. 0-41.60)

### *Outlook Summary*

Few opportunities expected in this small occupation. Oversupply of experienced workers is great and will continue indefinitely.

### *Nature of Work*

A navigator is carried only on international commercial air-line flights. Before each flight, he prepares the flight plan for the captain's approval and sees to it that all needed navigational equipment is in good condition and aboard the plane. In the air, he is responsible for knowing at all times whether the flight is progressing according to plan and advising the captain as to revisions in

routing made necessary by changing weather conditions or other unforeseen circumstances. He uses all available navigational methods—dead reckoning, celestial navigation, radio bearings, and pilotage. Another of his duties is keeping the flight log.

Navigators are stationed mainly in coastal cities, where activities employing them are commonly based.

### *Qualifications*

Every navigator is legally required to have a Civil Aeronautics Administration certificate. Among the qualifications which an applicant must have to be certified is a comprehensive knowledge

of air navigation and related subjects. This training has been obtainable so far mainly in the military and naval air services. Employers greatly prefer men with college education; a high-school diploma is virtually always a minimum requirement. Flight experience as a navigator and personal characteristics, such as height, appearance, and personality, are emphasized in hiring. Strict physical examinations must be passed to enter and stay in the occupation.

### *Outlook*

This is a very small field; in early 1948 employment was no more than 200 or 300. Expanding overseas air-line operations and other developments may lead to some openings, especially if general business activity remains at high levels. However, employment is not likely to increase as fast in this occupation as in most other air-line jobs.

In the long run, employment of navigators will probably decline; technological and other factors may cause the elimination of these flight-crew members on a number of routes. There is, for example, continued striving for international airways with radio-range beams and other aids in navigation like those used on domestic airways, though the establishment of such airways on a scale comparable with our own Federal Airways System is probably still a long way off. The increasing application of radar to civilian aviation may also make navigators unnecessary on a growing number of flights. The chances for continued and accelerated advancement along these lines have been enhanced by the interest in these matters shown by the President's Air Policy Commission, the Congressional Aviation Policy Board, and other bodies.

Under the best conditions foreseeable, it is likely to be difficult even for experienced men to obtain navigator positions. At the beginning of 1948, the air lines had many furloughed navigators with first claim on any openings. In addition, applicants with navigator experience in the armed forces have tended to outnumber openings, though only a very small percentage of the host of former military and naval Air Force navigators have sought civilian jobs in the occupation. Newcomers have practically no chance for positions. This

will almost certainly continue to be the case for several years at least—the oversupply may even grow—despite the Air Force expansion (the 70-group program) legislated in May 1948.

### *Earnings and Working Conditions*

Salaries are on a monthly basis. A very rough estimate suggests that average annual pay in early 1948 was in the neighborhood of \$5,000, with some men earning as low as \$3,000 and others making as much as \$6,000 and more. How much an individual navigator actually makes is dependent upon his grade (junior or higher), his length of service, and other factors.

When navigators are away from base on duty (as they are about half of the time), their living expenses are paid by their employer. Often they also get \$1 or more a day while on land for incidental expenses.

Flight time is generally not more than 255 hours a quarter, more or less equally divided between the 3 months. However, a few additional hours each month must always be spent in ground duties. One month's vacation with pay is usually given.

Navigators are covered by union contracts on almost all lines where they are employed. They are represented by the Air Line Navigators Association (a branch of the Transport Workers Union of America, CIO) on most of these lines, and by the Association of Airline Navigators (independent) on one.

### *Where To Get More Information*

Additional information on the occupation of navigator is given in:

U. S. Department of Labor. Bureau of Labor Statistics. Employment Opportunities in Aviation Occupations, Part I—Postwar Employment Outlook; Part 2—Duties, Qualifications, Earnings, and Working Conditions. Bulletins Nos. 837-1 and 837-2. (1945 and 1946.) U. S. Government Printing Office, Washington 25, D. C. Price, 10 cents and 20 cents.

Inquiries in regard to job openings should be sent to the personnel managers of the lines. Addresses are listed in part II of the bulletin just mentioned, or may be obtained from the Air Transport Association of America, 1107 Sixteenth Street NW., Washington, D. C.

# *Other Professional, Semiprofessional, and Administrative Occupations*

## **Accountants**

(D.O.T. 0-01.)

### *Outlook Summary*

Good employment prospects for Certified Public Accountants (C. P. A.) and others with considerable experience, at least in next few years; keen competition among the inexperienced. Continued upward trend in employment in long run.

### *Fields of Employment*

There are many types of accounting work, ranging from partnerships in accounting firms and controllerships in corporations to jobs at the clerical level. Accountants may engage in either public or private practice. Public accounting firms are usually headed by C. P. A.'s although they often employ other accountants; they render service to a number of clients on a fee basis. Private accountants work on a salary basis either for a single business establishment, keeping accounts of that business, or for Government agencies in such jobs as auditor, bank examiner, or tax examiner. In early 1948 there were about 30,000 C. P. A.'s, but altogether probably eight or nine times that number of persons were engaged in accounting work. Less than 10 percent were women, and many of these were in teaching positions; about 400 women were C. P. A.'s.

### *How To Enter*

Employment requirements vary with the type of work. A bachelor's degree with a major in accounting or a related field, or a diploma from a school of accounting is usually required for the better jobs, though experience may be substituted for part of the formal education. To qualify as a

certified public accountant and receive the certificate from a State board, one must meet certain educational and experience requirements and pass a rigid examination. Eighteen States have regulatory accountancy laws under which only registered accountants or certified public accountants can practice public accounting. Only one of these now allows registration of noncertified public accountants, although the other 17 formerly did so.

The accountant usually begins in a minor job—compiling data, preparing invoices, or as a junior assistant on the staff of a C. P. A. Advancement may be rapid for able accountants with sufficient educational preparation, but inadequate training often results in routine jobs with little opportunity for promotion—except in cases of unusual ability. Experience in accounting is an excellent background for many types of jobs such as credit manager, controller, purchasing agent, budget officer, and many executive positions.

### *Outlook*

There is a shortage of qualified accountants (early 1948), which is more pronounced in some localities than in others. Employment opportunities have increased in recent years because of such factors as complex tax systems and a growing emphasis on scientific management in industry. The war greatly increased the demand for accounting services, especially in the Government. While Government personnel requirements have fallen off, the upward trend in private industry still continues. Many employers, newly introduced to the value of accounting services during the war, now see the advantage of maintaining

production control systems, regular auditing services, and a variety of other accounting practices. Teachers are now badly needed to instruct the greatly increased number of students in schools of business administration and accounting.

Public accounting firms in some areas are now obliged to turn away business because of a shortage of experienced accountants. This in turn has created surpluses of inexperienced workers, who cannot be employed without senior accountants to supervise them. The shortage of experienced accountants will soon be relieved, since many of the veterans now being trained are mature enough to be given responsibilities after a relatively short period of experience. Even so, the surplus of inexperienced workers is likely to become greater because of the large number now in training.

There are some employment opportunities for accountants in every community and in nearly all industries, but the greatest number of jobs, as well as the keenest competition, will continue to be in industrial centers such as New York and Chicago. However, the decentralization of industry has increased the demand for accountants in the smaller industrial communities. Throughout the country, the trend toward increased use of accounting services can be expected to persist over the long run, provided that general business activity remains at a high level.

### *Earnings*

Salaries for beginners were typically from \$1,800 to \$2,400 in 1947, according to one estimate. Salaries of staff employees of public accounting firms ranged from \$1,800 to \$10,000 per year, with a very few running higher. Incomes of partners or heads of firms may be much greater. Prewar average net annual income of those in independent practice was about \$5,300 for C. P. A.'s and about \$3,000 for others; present incomes are probably considerably higher.

Federal civil-service entrance salary for junior accountants and auditors is \$2,724; assistant accountants and bank examiners begin at \$2,974; accountants and auditors, who must meet higher qualifications, start at \$3,351 a year. More responsible positions at higher pay are usually filled through promotion.

### *Where To Go for Further Information*

Information, particularly on C. P. A.'s, may be obtained from:

American Institute of Accountants,  
13 E. 41st St.,  
New York 17, N. Y.

Information on the field of cost accounting may be obtained from:

National Association of Cost Accountants,  
385 Madison Ave.,  
New York 17, N. Y.

## Insurance Underwriters

(D.O.T. 1-57.30)

### *Outlook Summary*

Openings in this small occupation almost always filled by promotion of experienced personnel. Opportunities for such advancement somewhat limited.

### *Nature of Work*

Underwriters decide on the insurability of applicants for life or other insurance, in line with company policy. They usually specialize in life insurance, in some branch of general insurance (fire, casualty, marine, suretyship, or other), or in a subdivision of one of these branches. Duties include analyzing applications for insurance or

reports on applicants by doctors and other investigators. The work often involves considerable responsibility and judgment, especially in general insurance. Most underwriters are employed in the home offices of companies writing policies. A few work for large agencies.

### *How to Enter*

The usual way of entering the occupation is through promotion from clerical jobs in underwriting departments. A number of colleges and special insurance schools offer helpful courses in insurance, but few if any give training in underwriting. Even college-educated people must therefore obtain their skills largely through sev-

eral years of practical experience in subordinate positions.

### *Outlook*

There will be a number of openings in this occupation during the next year or two. Altogether, only a few thousand underwriters were employed in early 1947, most of them men. An unusually large number of promotions were made during the war, to fill vacancies due to the draft and other causes. Since VJ-day, a good many veterans and other former employees have come back to their jobs; some who were not previously full-fledged underwriters were advanced to this status on their return. Employment now exceeds the prewar level. In all likelihood, it will tend to increase somewhat over the long run, but not as fast as during the last year or two. Although insurance business is expected to expand, the number of underwriters employed will not rise proportionately. It would be surprising if they numbered 5,000 by 1960, even assuming continued high levels of economic activity.

Competition for promotion is keen among the thousands of eligibles. Only those with the best qualifications are selected to fill the vacancies. Most openings in entry jobs and opportunities for advancement will be in the East, especially the New York City area and in Hartford, Conn.,

where the home offices of the major insurance companies are concentrated. On the other hand, competition for beginning jobs and promotions may well be less in other parts of the country.

### *Earnings*

Underwriters are paid regular salaries. In general, earnings are highest in the Middle Atlantic and Pacific regions. Men's earnings tend to be considerably higher than women's. In January 1947, male underwriters in home offices of life-insurance companies had average straight-time weekly earnings of about \$72, as compared with \$49 for female underwriters. Underwriter clerks, of course, had considerably lower earnings—about \$41 a week for men and \$33 for women.

### *Where To Get More Information*

Questions on employment opportunities, how to prepare for underwriting work, earnings, and other matters may be addressed to home offices of the big insurance companies or trade associations in the insurance industry, including the following:

Life Insurance Agency Management Association,  
115 Broad St.,  
Hartford, Conn.

Life Office Management Association,  
110 E. 42d St.,  
New York 17, N. Y.

See also *Life Insurance Agents*, page 153; *General Insurance Agents and Brokers*, page 152.

## Interior Decorators

(D.O.T. 0-43.40)

### *Outlook Summary*

Expanding field. Good employment prospects for well-qualified persons. Some openings for new entrants, especially in suburban areas.

### *Nature of Work*

Decorators design interiors for homes, hotels, ships, theaters, business offices, and other places. They estimate costs and, in most cases, purchase furnishings and supervise their installation. They may also plan displays and model rooms and promote current decorating fashions in other ways. A good many sell draperies, upholstered furniture, and other small furnishings and have their own

workshops where these articles are made. Many are employed by large decorating firms or department stores or are in business for themselves. At present, the majority are women.

### *Personal Qualifications and Training*

A good interior decorator combines the abilities of the architect, designer, and artist. He must have a knowledge of drawing, materials, color, interior construction, furniture design and arrangement, fine arts, lighting, and estimating. Salesmanship and a pleasing personality and appearance are among the personal qualifications needed.



A good educational background is very important. It is helpful to begin preparing while in high school by studying such subjects as mechanical drawing, art, and business administration. Two years of college are considered desirable before entrance into one of the specialized schools of interior decoration, which offer a 3- or 4-year professional course. Some persons get their training at trade and vocational schools, but they are likely to meet keen competition later on from persons with more advanced training.

After completion of schooling, on-the-job training with an established decorating firm or department store is invaluable. A beginner may have such duties as keeping stock in order, selling home furnishings, or acting as assistant draftsman. From these entry jobs one may advance to decorator's shopper; then to assistant decorator; and finally to decoration consultant or other top position. Practical experience is particularly necessary for persons planning to go into business for themselves.

### *Outlook*

Employment prospects are good for well-trained persons in this relatively small but expanding field. Opportunities have increased since the end of the war, as a greater amount and variety of decorating materials have become available. Some additional openings are expected, in the near future, provided that general business activity continues at a high level. The large number of new homes being built will tend to create an increased demand for the services of the interior decorator. There is also a large demand for redecoration, since interiors have grown worn and shabby in the past few years. Persons with insufficient training and experience are available, but the supply of new entrants who are qualified to advance to top positions has not kept up with the growing demand.

Opportunities are likely to be very good in areas adjacent to large cities and in cities with populations between 50,000 and 150,000. However, persons employed in these cities must usually be content with small businesses and may have difficulty in securing materials. In a few large cities, where most of the specialized schools of decoration are located and where furnishings are easiest to obtain, an oversupply of decorators may exist. Opportunities for beginners in these areas are therefore limited.

The demand for interior decoration should tend to increase over the long run. Formerly, this was considered a luxury service, but in recent years, there has been more and more professional decorating of moderately priced homes and offices. Construction of new houses, schools, hospitals, and other buildings should also provide an increasing demand for the service. However, this occupation is far more affected by declines in business activity than many others. Only if general economic conditions continue to be good may the great majority of decorators look forward to continued employment over a long period of time.

### *Earnings*

Typical earnings of beginners in entrance jobs were around \$30 to \$40 per week in some large cities at the beginning of 1947. A wide range of earnings existed among established decorators, depending on size of establishment, size of city, income of clientele, and other factors; some earned upward of \$10,000 or even \$20,000 per year. Most of those in the upper income brackets were in business for themselves, although high salaries were often paid by large establishments to department heads and others.

### *Where To Get More Information*

American Institute of Decorators,  
41 E. 57th St.,  
New York, N. Y.

## Photographers

(D.O.T. 0-56.01; 0-56.31)

### *Outlook Summary*

Limited number of openings for highly qualified persons in next few years; keen competition among new entrants. Long-run trend in employment slowly upward.

### *Nature of Work*

Photographers usually specialize in portrait, commercial, news, or aerial work. They must be able to use cameras, lenses, filters, and other equipment and have knowledge of lighting. They must also be able to do such work as developing, finishing, printing, enlarging, and retouching, much of which requires the knowledge and use of chemicals. In small shops, the photographer himself may do all this work. Even in large studios employing photographic technicians, he often develops and prints his own pictures.

### *Where Employed*

Most photographers are employed in studios handling portrait or commercial work. Others work for newspaper and magazine publishers, advertising agencies, manufacturing plants, and Federal, State, and local governments. Many are in business for themselves.

There are photographers in all parts of the country, in small towns as well as large cities. However, in 1940, over half were employed in only six States—New York, Illinois, California, Pennsylvania, Ohio, and Michigan.

### *How to Enter*

Usual method of entering the occupation is by training on the job. This usually takes 2 or 3 years and covers all phases of photography, the trainee advancing through the various operations. Some employers have formal apprenticeship programs. Persons may also enter the occupation by attending a school of photography. However, completion of a school course cannot substitute for on-the-job training, though it may shorten the training period. Selection of a reputable school is

very important. Veterans whose only experience in photography was obtained in the armed forces will need additional training for civilian work.

High-school education, with emphasis on chemistry, physics, and art, is recommended for all prospective photographers. They should also have artistic ability, a pleasing appearance and personality, and a good business sense, if they expect to go into business for themselves.

### *Outlook*

Openings will not be numerous in the next few years. In 1940, there were 37,600 photographers; 3,900 were unemployed. Employment rose sharply during the war, mainly because of increased demand for portrait work. Since VJ-day, this demand has fallen off. The number of portrait studios and of photographers employed have therefore decreased. However, employment is likely to remain above the prewar level. There will be a limited number of openings for highly qualified persons, particularly in commercial work, but competition for training positions and beginning jobs is likely to be keen in the near future. Veterans and others should be very cautious about taking over a portrait studio, in view of the drop in this type of business.

Employment will probably rise slowly in the long run, though it is not likely to reach the wartime level for a number of years. In addition, there will be some openings because of deaths and retirements. Best opportunities may be expected in commercial work, owing to expanded use of photography in advertising, record keeping, medicine, and other fields. Commercial photographers will also have a better chance of steady employment over a long period of time than those doing portrait work, which is the branch likely to be most affected by declines in business activity.

### *Earnings and Working Conditions*

Typical salaries for experienced portrait photographers ranged from about \$50 to \$100 per week in some large cities in early 1947. Those

with established reputations earned much more in many instances. Salaries of commercial photographers were about the same; many working on a job basis. News photographers usually averaged about \$40 per week, with some receiving as high as \$90 or more, at the beginning of 1947, depending on the circulation of the newspaper or magazine. Aerial photographers typically earned from \$40 to \$50 per week, plus any traveling expenses they may have incurred. In Federal Gov-

ernment jobs, base salaries ranged from \$2,284 to \$4,480 per year depending on the grade of job.

Commercial and news photographers often work nights and Sundays. Portrait photographers have rush seasons and may work long hours at these times.

#### *Where To Go for More Information*

The Photographers' Association of America,  
520 Caxton Bldg.,  
Cleveland 15, Ohio.

## Commercial Artists

(D.O.T. 0-44.11, 13, and 21)

### *Outlook Summary*

Expanding field. Good prospects for well-trained and experienced persons in next few years, but keen competition among new entrants.

### *Nature of Work*

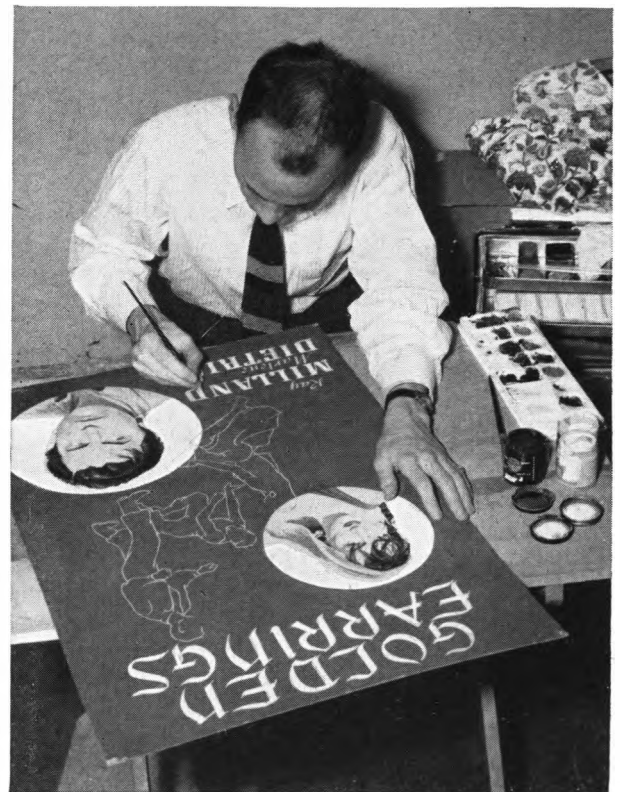
Commercial artists design and draw illustrations for advertising copy, books, magazines, and newspapers. They also create posters for billboards and other uses. Preparation of charts and maps for exhibition or publication is another type of work handled. Experienced artists usually specialize in a particular product or field—for example, fashion or industrial illustrations, furniture advertising, or story illustrations.

### *Where Employed*

The largest employers of commercial artists are advertising concerns, department stores, newspaper and magazine publishers, mail-order houses, and calendar and greeting-card companies. Some people work as free-lance artists on an independent basis or own a commercial art studio employing several other artists. Most are employed in or near metropolitan areas where the largest users of commercial art are located.

### *How To Enter*

Most commercial artists begin their training in high-school art classes or at vocational art schools and later acquire practical experience. However, some enter through on-the-job training periods of varying lengths, combined with part-time school-



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Experienced commercial artists usually specialize in a particular product or field—example, theater poster advertising.

ing. Still others enter by obtaining certificates from schools of fine and applied arts; the courses of study offered by such schools usually take 3 years and cover all phases of art work.

Selection of a reputable school is very important. The basic education received should include

art courses, mathematics, science, and history. A knowledge of lettering and typography, as well as drawing, is essential.

Beginners must be content to start at the bottom, performing routine jobs, and work up until their ability is recognized. Artistic talent, originality, resourcefulness, and salesmanship are among the personal qualifications needed for success.

### *Outlook*

Good employment opportunities for well-trained and experienced persons are expected in the next few years. There will also be some openings for new entrants possessing exceptional ability and good training. Highly qualified commercial artists are needed because the number of such persons entering the field decreased during the war. Moreover, manufacturers and retailers are beginning to face or are looking forward to a highly competitive market for their goods; advertising and therefore commercial art will play an important part in this competitive selling. At present (early 1948), large numbers of partially trained persons with only average artistic ability are seeking work and enrolling in art schools, but many of these people who are attempting to enter

the occupation will never succeed because of their lack of talent.

The demand for commercial art is likely to expand over the long run also. The growth of this field has been rapid in the past and further growth is expected. Visual advertising, especially in magazines and newspapers, should continue to develop rapidly, as it has in the past 10 years. Other forms of commercial art, such as poster and window displays, greeting cards, calendars, and use of visual aids in education should continue to employ an increasing number of artists. However, competition for beginning jobs is usually rather keen. In depression periods even the experienced artists are likely to have less work and lower earnings, though the occupation tends to be less affected than many others by declines in general business activity.

### *Earnings*

Beginners received about \$30 or \$40 per week in entrance jobs such as tracer or copyist in early 1947. Experienced artists had a wide range of earnings; those with established reputations made upwards of \$10,000 yearly—sometimes much more.

*See also* Interior Decorator, page 98; Industrial Designers, page 78.

## Furniture Designers

(D.O.T. 0-46.12)

### *Outlook Summary*

Outlook good for those already in the field and for a very few new entrants who show exceptional talent.

### *Nature of Work*

Furniture designers develop and sketch designs—work requiring skill, originality, and good taste in addition to a knowledge of design, materials, and period styles. The furniture designer, though essentially an artist, must have the technical ability to create models adaptable to consumer needs and to modern methods of factory production as well. After sketching the broad central idea, some designers build and finish their own models, often to full scale. Usually, however,

their work is confined to making drawings and diagrams which are translated into working plans by draftsmen, patternmakers, and model makers.

### *Training*

Furniture design is one of the specialized fields in the broader field of industrial designing. As part of their necessary formal training, designers study fine arts and industrial design in an art, trade, or technical school. The specialist in furniture design acquires, in addition, a well-rounded knowledge of furniture history, architectural trends, and classical furniture style.

### *Where Employed*

Furniture designers are employed by individual firms in furniture centers such as High Point,

N. C.; Jamestown, N. Y.; Rockford, Ill.; Grand Rapids, Mich.; and Gardner, Mass. But most industrial designers work in large industrial cities, such as New York, Chicago, and Los Angeles.

### *Outlook*

Current sales show that purchasers prefer furniture which is original and attractive in design. Manufacturers are anxious to stimulate style consciousness because it leads to the replacing of furniture which, though not worn out, has an outmoded appearance. To create models which will stimulate the buyer's desires, manufacturers are

turning more and more to the designer for ideas.

For the most part, furniture manufacturers obtain their designs from consultants. These consultants, members of industrial designing firms, develop such diverse products as chinaware, furniture, vanity accessories, and department-store interiors. However, a small number of furniture manufacturers retain a full-time specialized designer. Because so few manufacturers maintain their own designing departments, the profession of furniture designer is small and may easily become overcrowded. Although not entirely closed to the exceptionally talented specialist, opportunities for new entrants are very limited.

## Fur Designers

(D.O.T. 0-46.06)

### *Outlook Summary*

Only a few prospective designers with exceptional talent will be able to enter this field. Although the occupation is a growing one, it is still very small.

### *Nature of Work*

Fur designers create original designs for fur garments and invent new variations in basic designs. Since there is a limited number of things which can be done to a fur coat (such as attention to sleeves, collars, shoulders, etc.) there is really no such thing as a completely original design. Considerable imagination and ingenuity is necessary to develop styles that appear noticeably different from last year's models. In addition to creating the styles, fur designers may make, or supervise the making of, canvas models from the patterns, and they often draw lay-outs showing how the skins are to be used in making a particular fur garment.

The nature of a designer's work varies somewhat depending on the place of employment. Some work in patternmaking houses, where ideas are sketched and drafted into patterns to sell to fur garment manufacturers and retail furriers. Others are employed by manufacturing firms and by a few of the larger retail fur shops which keep

a designer on the staff to sketch models and draft patterns exclusively for them.

There are furriers in retail shops all over the country who do some designing now and then as a part of their regular job of making or remodeling fur coats. But nearly all of the full-time designers work in New York City, where most of the patternmaking and wholesale manufacturing houses are located.

### *How To Qualify as a Designer*

Many fur designers break into the field by getting experience in patternmaking houses. They advance from patterncutting and patternmaking to designing as they become more proficient. Furriers in fur shops and designers of cloth coats and dresses occasionally take up fur designing. Although courses in sketching, patternmaking, costume designing, and other related subjects are helpful to the would-be designer, probably no fur designer has ever come directly out of a school. There are no apprenticeship programs. Designing requires artistic and creative ability which, while doubtless stimulated under supervised training, cannot be acquired.

### *Outlook*

Even if the fur business should expand in the next few years—which at this point (early 1948)

does not seem likely—very few additional designers would be needed. The occupation is very small; there are probably not over 200 full-fledged fur designers. As long as times are prosperous, however, those already in the field will be steadily employed.

Designing is an occupation that has become increasingly important to the fur industry. It is only within the past 20 years that manufacturers of fur garments have become style conscious. Formerly all fur coats were made over the same basic pattern. Now style is as essential to fur coats as it is to dresses, cloth coats, and other clothing.

### *Earnings*

Designers employed in ready-made fur garment plants in New York City are guaranteed at least \$90 per week by union contract. On the whole, designers regularly employed by a firm usually make anywhere between \$5,000 and \$10,000 a year if they have a steady job as a salaried worker. Some are partners in designing and patternmaking houses which sell their patterns to manufacturers on a fee basis. Pattern-cutting and patternmaking, occupations through which many fur designers get their start, pay betties for new entrants are very limited.

## Lawyers

(D.O.T. 0-22)

### *Outlook Summary*

Profession somewhat overcrowded at the lower levels and likely to become more so in next few years. Continued expansion in demand for legal services likely in long run.

### *Nature of Work*

A large portion of lawyers' work consists in advising clients on their legal rights and obligations and in negotiating settlement out of court. In addition, lawyers prosecute or defend both civil and criminal law suits in the courts. They also represent clients before semijudicial or administrative agencies of the Government; draw up legal documents; often act as trustee, guardian, or executor, and do other legal work.

It is roughly estimated that there are over 180,000 lawyers and judges in the United States, including 4,000 women. About two-thirds are self-employed. Most of the remainder are either in Government service or on the legal staffs of big corporations.

### *How To Enter*

To be admitted to the bar, it is usually necessary to pass a State examination, besides meeting certain educational requirements. Most States require graduation from a law school approved by

the State or the American Bar Association (about 110 of the Nation's 163 schools are approved by the A. B. A.). A few States admit graduates of their own State university law schools and occasionally of other specified schools to the bar without examinations. Several States require 6 to 12 months' clerkship in a law office, in addition to the specified education and bar examinations. Reciprocity arrangements which exempt persons with 3 to 5 years' practice elsewhere from further examinations are in effect in most States. To be admitted to an approved law school 2 or more years of pre-law college work are generally necessary. Some States and many law schools have higher requirements and the trend is toward still higher ones.

Young lawyers usually start as junior assistants in an established office. Many stay on with these firms and, in time, may become partners. After gaining some experience, others open their own offices and are then faced with a "starvation period" of several years. All States and bar associations forbid lawyers to advertise or solicit business; therefore, to become known, it is important to participate in community affairs and to get on national commercial law lists and on the lawyers reference list, if one exists in the area. A neighborhood law office is often a good way of attracting clients in large cities.

### *Outlook*

The legal profession is already somewhat overcrowded at the lower levels and is likely to become much more so during the next few years. Enrollment in law schools in the fall of 1947 was over 50,000, the highest ever reached. It will remain very high for several years, but will probably drop somewhat thereafter, as the great number of veterans now enrolled complete their training. Top-ranking students will continue to find jobs with little difficulty. The average graduate of the next few years may expect increasingly stiff competition, however, and will need the best preparation possible. Opportunities for teaching are now exceptionally good. Prospects for Negro lawyers are relatively favorable, particularly in urban areas with a large Negro population (except Chicago, Washington, and New York).

The profession is expected to go on expanding over the long run, owing to the growing population and various economic and social trends which will increase the need for legal services. Deaths and retirements will also create a considerable number of openings. The tendency toward overcrowding in the profession will probably continue, however, unless ways are found to make legal services available to greater numbers of lower income people. Legal aid societies have for many years been offering free services to those who could not afford to pay anything; many people who can afford small fees do not use the legal services they need, largely because the charges are beyond their means. Attempts have been made to provide competent low-cost legal services through such plans as the Legal Service Bureau and neighborhood law offices. If services of this nature become widespread and well known, the new legal business opened up will help absorb the surplus of young lawyers.

Opportunities for specialists are usually better than for lawyers in general practice; many of the larger law firms have such specialists on their staffs. Specialties with relatively good prospects in the long run are: Tax law (thorough knowledge of accounting is necessary and government experience helpful), patent law (scientific or engineer-

ing training is often required), administrative law, admiralty law, and international law. Legal training is becoming increasingly useful for many types of business and is a great asset to people seeking public office.

Best opportunities usually lie in medium-size and small cities, especially those with prospects of economic expansion. State capitals and county seats may also offer good opportunities. The profession is especially overcrowded in the very largest cities and in Washington, D. C.

### *Earnings*

According to a 1941 survey, average net income of lawyers in private practice was then around \$4,800; half made under \$3,000. In New York City, incomes averaged about \$5,900, but half made under \$2,800. In other cities of over 500,000, the average income was \$6,700, with half making less than \$3,300. Highest incomes were reported in the far West and the Middle Atlantic States. There have been substantial increases in earnings since 1941.

Lawyers' operating expenses are high, absorbing, on the average, about one-third of gross earnings. Frequently, two or more lawyers share the same offices to reduce overhead costs. Many of them, particularly in small towns, have to have some other source of income such as a farm, real estate, or other business.

### *Where To Go for More Information*

Information on such matters as law schools, their entrance requirements, and employment opportunities in a particular locality may be obtained from the main headquarters or from the local chapters of:

- (1) American Bar Association,  
1140 North Dearborn St.,  
Chicago, Ill.
- (2) National Lawyers Guild,  
902 20th St. NW.,  
Washington, D. C.

Specific information on requirements for admission to the bar may be obtained from the clerk of the State supreme court at any State capital.

## Social Workers

(D.O.T. 0-27)

### *Outlook Summary*

Excellent immediate opportunities in all types of positions. Long-run outlook good for workers with graduate training; those with only undergraduate training will face increasing competition.

### *Nature of Work*

Principal types of social work are case work, including family social work, child-welfare work services, and work with delinquents; group work; community organization; social research; and social administration. The majority of social workers are employed by Federal, State, and local governments; most of the remainder by private social agencies; a few by private industry. They are to be found in all parts of the country, in both urban and rural areas.

### *How To Enter*

There are 47 accredited schools which give graduate training in social work. Such training is usually considered necessary for positions involving advanced case work and is desirable for all jobs. Qualifications for most Federal civil-service positions can be met either by certain types of social work experience or by a combination of training and experience. Entrance requirements for graduate schools include undergraduate courses in social and biological sciences and, usually, a certain level of scholastic achievement. For those who must enter the field with only a B. A. degree, some colleges and universities offer preprofessional courses in social work. Some positions, especially in public-assistance work, can be entered with still less academic training.

It is roughly estimated that there are at least 100,000 social workers at present. The majority (approximately 65 percent in 1940) are women. The proportion of Negroes employed is small, but greater than before the war.

### *Outlook*

There is an acute shortage of social workers (early 1948), due largely to the increased use of

social service and the inability of the professional schools to keep pace with the demand. School enrollments have increased since VJ-day, especially in the number of men students, and the schools have waiting lists of applicants. War services which used great numbers of social workers are continuing, though on a smaller scale; the



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR.

Social work requires tact and understanding in helping people deal with their problems.

Veterans Administration needs more trained workers than can be found in many areas; new projects, such as the Mental Health Act, also require trained workers; and older programs, such as child welfare and public assistance in the Social Security Administration, have increasing need for professionally trained workers. Experienced workers are advancing rapidly to better positions, leaving openings in the lower-paid jobs. Shortages are most severe in rural areas, though the greatest numbers are employed in cities.

Workers with graduate training will probably find good employment opportunities in the long run, as well as in the immediate future. Only a small proportion of social workers now have this training. Before the war there was a definite trend



toward higher training requirements, which may be expected to be resumed as soon as shortages are less severe. Workers without graduate training will therefore find it increasingly difficult to meet the competition. How many people will be employed in the field as a whole will depend largely on the appropriations for public social work by Federal, State, and local governments; to a lesser extent on community support of private agencies. In any case, many openings will arise owing to turn-over, which is high because many women leave the field to marry (though marriage is not necessarily a barrier to employment).

Opportunities for men will be particularly good. The number of administrative jobs is increasing and men are frequently preferred for these positions; also, men have been entering other types of social-work positions in greater and greater numbers since the war, when many of them gained experience in medical and psychiatric services.

Social workers are not likely to be as much affected by declines in business activity as are many other occupations, though there may be a

shift from specialized services to dispensing of relief.

### *Earnings*

Salaries vary greatly according to type of work, size of agency, location, training, experience, sex of worker, and other factors. At the present time earnings are increasing rapidly. In the public-assistance field salaries in beginning positions ranged from about \$900 to \$2,200 per year in 1946. In large cities experienced case workers in most fields typically made from about \$2,000 to \$2,600; those in small cities and rural areas made somewhat less. Typical salaries for administrators varied from about \$3,600 to \$13,000, depending on the size of the agency. Entrance salary for most social-work jobs in the Veterans Administration is \$3,727.

### *Where To Find Out More About Social Work*

American Association of Social Workers,  
130 E. 22d St.,  
New York 10, N. Y.

## Personnel Workers <sup>1</sup>

(D.O.T. 0-39.82 and 83; 0-68.71, 72, and 73)

### *Outlook Summary*

Field overcrowded at present. Long-run employment trend slowly upward, but keen competition for entry jobs likely to continue for several years.

### *Nature of Work*

Personnel workers maintain personnel records, and assist in recruiting, placing, training, rating, disciplining, and discharging employees. They may also be responsible for job standardization and classification and wage setting; for employee welfare services, health, and safety; for compliance with Federal and State labor laws; and for an employee-information service. Labor relations is becoming one of the most important parts of their work. In a small company, one man may handle all this work; in the largest ones, the personnel manager is a top-ranking executive who advises in setting of personnel policies and has under

him hundreds of personnel-department employees.

Professional personnel workers in late 1946 totaled no more than 30,000, according to one rough estimate. Directors or managers make up only a small proportion of this total. Personnel workers are employed in all industries; about 5,000 work for Federal, State, and local governments; some are employed by schools and colleges. Men with long and varied experience may work independently as private consultants or labor-relations experts.

About three out of every four people in the profession are men. Very few women have top managerial positions, but many are in technical personnel jobs such as classification and placement, in interviewing and counseling, and in personnel research—particularly in government and industries with large numbers of women workers.

<sup>1</sup> Excludes student personnel workers in schools and colleges.

### *How to Enter*

Requirements for positions usually include a bachelor's degree, with courses in personnel and public administration, psychology, statistics, business management, economics, sociology, and political science. Graduate study is becoming increasingly useful.

Work experience is very important, particularly for positions in private industry, which are usually filled from within. The best place to start out is in a production job. Other good places are subprofessional jobs in time study, job analysis, or wage setting, or, in the case of women, clerical work in the personnel department. Psychological testing is one of the few branches of industrial personnel work which can be entered directly from college; it usually requires a graduate degree.

### *Outlook*

At present (early 1948), there are a few openings at top managerial levels for experienced men, but competition for lower-grade positions is very keen. During the war, many inadequately prepared people gained some experience in personnel work in civilian industries and the armed forces. The number of these partly qualified workers who are seeking jobs now greatly exceeds the number of available openings. Totally inexperienced persons will find it very difficult to enter the field in the next few years.

In the long run, the profession will probably grow slowly. Openings will not be many, however, because the field is still relatively small and turn-over is low. Not only is the profession staffed mainly by young men, but people who succeed in making headway in it seldom transfer to other occupations. In general, promotions will be slow. Best opportunities for jobs will be with small and middle-size companies. Fields in which increasing employment is expected include wholesale and retail trade, especially department stores, insurance and finance, and State and local governments.

Employment in the Federal Government has dropped since the war but is expected to stabilize

at a point close to present levels; little expansion is likely in the near future. Nevertheless, many personnel workers will always be employed by the Federal Government. Veteran's preference will be observed in any entry jobs that do arise.

A very few outstanding men will continue to find opportunities as labor arbitrators or independent personnel consultants. There will also continue to be numerous openings for people with graduate degrees to teach personnel administration.

Most jobs, along with the keenest competition, will be in highly industrialized parts of the country, principally New York, New Jersey, Pennsylvania, Ohio, Illinois, and the west coast.

### *Earnings*

Starting salaries for personnel clerks in the Federal Government are usually about \$2,730 or \$2,980 per year. Personnel specialists start at about \$2,980 while personnel directors earn from \$6,000 to \$10,000. State and local governments pay salaries that are generally somewhat lower. In private industry, starting rates are lower than in the Federal Government but top salaries are much higher; earnings depend both on the general salary level of the company and on the degree of recognition given to personnel work. Beginning positions such as job analyst, time-study man, and interviewer generally pay from \$1,800 to \$2,600 per year. The most usual salary for a personnel manager is apparently between \$6,000 and \$8,000 per year. However, small companies may pay as little as \$5,000 and giant corporations as high as \$30,000 or more to a vice president in charge of personnel.

### *Where To Go For Additional Information*

Society for the Advancement of Management,  
84 William St.,  
New York 7, N. Y.

Information may also be obtained from the local chapters of this organization and from the deans of any of the major colleges of business administration.

## Librarians

(D. O. T. 0-23.20)

### *Outlook Summary*

Immediate employment opportunities are very good for professionally trained librarians. New entrants should find employment readily for the next several years at least.

### *Nature of Work*

The major divisions of the work of every library, large or small, general or specialized, are administration, book selection and order work, cataloging and classification, circulation work, and reference service. In a small library the librarian may perform the duties involved in all or several of these functions. In a large organization, different librarians handle each function and there are additional positions such as children's librarian, readers' adviser, public-relations director, subject specialists, personnel director, and positions of a strictly administrative nature.

### *Training*

To obtain a position as librarian, one must be a college graduate and have completed a year in one of the 34 accredited library schools either before or after obtaining the bachelor's degree. Two-thirds of these schools give graduate training only. The other third include the curriculum in library science within the undergraduate 4 years. Several library schools enroll students at the beginning of the third college year for 2 or more years of combined study in library science and subject fields. Undergraduate study should include history, literature, at least one modern foreign language, and research methods. Considerable knowledge of the physical or the social sciences is particularly important in library service today.

### *Where Employed*

There are about 30,000 trained librarians (early 1948), of whom 90 percent are women. The 7,400 public libraries employ slightly more than 40 percent of these people. Centralized libraries in elementary and secondary schools (numbering some 20,000) employ about 30 percent, although, as a

rule, only large schools have specially trained librarians. College and university libraries (numbering about 1,700) employ nearly 18 percent. The remainder work in approximately 1,500 special libraries and 230 Federal and State libraries.

### *Outlook*

Employment opportunities for trained librarians are very good (in 1948), and there will be good opportunities for new entrants for several years. Growth in this field has been rapid in the past and there are indications of further expansion. Even before the war the annual placement of library-school graduates reached 100 percent. A shortage of librarians was intensified during the war when library-school enrollments dropped steadily. There is considerable turn-over in this field because many young women marry and leave their jobs, and both men and women find positions in other fields in which knowledge of librarianship is an asset. A return to library-school enrollments of prewar size (about 1,500 were graduated each year) will not meet the needs of libraries for replacements and new positions created by expanding facilities in the next few years.

The greatest number of opportunities will continue to be in positions now found in most libraries—reference and circulation librarians, catalogers, librarians for service to children and young people, and school librarians. A smaller number of librarians will be needed for positions which require special competence and preparation—administrators, subject specialists, extension librarians, librarians in adult education, public-relations specialists, hospital librarians, and librarians to develop the use of audio-visual materials. There is need for librarians who can administer and at the same time perform most of the routine work in small libraries, since these libraries far outnumber the large ones.

### *Earnings*

Inexperienced library-school graduates for 1947 had a minimum entrance salary of \$2,300 with an

average of \$2,500. Salaries vary considerably with type of work, training, experience, and size and location of library. A survey of library personnel in 31 cities of over 200,000 population in 1947 showed that department heads had a median minimum salary of \$2,967 and a median maximum salary of \$3,870; branch librarians (not including sub-branch librarians) had median minimum and maximum salaries of \$2,300 and \$2,800, respectively; and catalogers (exclusive of first assistants and department heads), \$2,100 and \$2,660. With the Federal Government, the basic entrance salary for qualified professional librarians is \$2,974 a year. Salaries are usually somewhat higher in special libraries than in general libraries.

### *Where To Go for Further Information*

Information, particularly on schools, requirements, and placement, may be obtained from:

American Library Association,  
50 E. Huron St.,  
Chicago 11, Ill.

Information on special libraries may be obtained from:

Special Libraries Association,  
31 E. 10th St.,  
New York City 3, N. Y.

Statistics of library systems and other information will be furnished by:

Federal Security Agency,  
Office of Education,  
Washington 25, D. C.

## Newspaper Reporters and Editors

(D.O.T. 0-06.43, .44, .45, .47, .48, .51, .52, and .71)

### *Outlook Summary*

Occupation somewhat overcrowded at present. In long run, opportunities in newspaper work will probably continue to be limited, but some expansion in related fields is expected.

### *Nature of Work*

Newspaper reporters gather facts for news stories which may be written either by them or by a rewrite man. There are many types of editors, with varying degrees of responsibility. Department editors handle a particular kind of news such as sports or society. City editors assign reporters, photographers, and rewrite men to local news stories and may edit stories and headlines. Managing editors have complete charge of the editorial department and, with the publisher, set the general policy of the paper. Editors are usually recruited from reporters. Taking both groups together, about 58,000 were employed in 1940; approximately one-fourth were women.

### *Qualifications, Training, and Advancement*

Talent for writing is essential and often outweighs academic training in getting jobs and promotions. A general college education is desirable, however. More and more, employers are giving preference to people with formal training in jour-

nalism, history, and economics.

People usually get into the occupation by starting as a "cub" reporter on a small newspaper or a trade-association paper or by working up from the job of copy boy (where they begin as messengers and advance to routine reporting assignments). Small country and suburban papers prefer local men who know the community and have related skills, such as photography or printing. Trade associations prefer people with a knowledge of their particular field. Many large papers and syndicates hire college graduates as copy boys and give them a chance at reporting after several months.

Reporters may advance to positions as copy readers or to editorships, get reporting jobs on larger papers or with syndicates, or transfer to a variety of better paying, related jobs. They may also do free-lance reporting for more than one newspaper or magazine.

### *Outlook*

The reporting field is now (in the early part of 1948) somewhat overcrowded, though the surplus of reporters that followed the return of ex-newspapermen from the armed forces is declining. Newspapers are making occasional lay-offs, to cut costs or for other reasons, but the workers displaced are often able to find other reporting jobs.

Some men are also finding jobs in related fields. New entrants will probably continue to have a hard time obtaining positions in large cities, where there are generally experienced reporters and editors available for employment. The best chance of jobs for inexperienced people will be with small country papers.

Employment of reporters and editors on newspapers is not likely to increase much in the long run, though there will always be some openings owing to turn-over. The trend toward fewer papers will probably continue and lead to layoffs. Technological developments and the greater interest of the reading public in national and international affairs point toward increased use of syndicated material—which would mean less need for reporters on the papers using the service. Competition for reporting jobs will probably continue to be great since many young people are attracted by the reputed glamour of the work; however, talented people with little formal training have a chance of breaking into this profession.

There will be some opportunities, mainly for experienced workers, in fields related to newspaper work. There are plans to start many more new magazines as soon as enough paper is available. Book publication is increasing; so are the public relations and radio fields. Advertising agencies may also be able to use some additional newspapermen.

### *Earnings*

American Newspaper Guild minimum rates for cub reporters with no previous experience were

\$35 to \$50 a week in early 1948. Minimums for experienced reporters ranged between \$70 and \$100 with actual going rates considerably higher. There are no set salary standards for editors; some may make as little as \$60 a week, while the managing editor of a large metropolitan daily may earn as much as \$50,000 a year. Salaries vary with size of the paper, type of job, experience, and other factors.

### *Where To Go for Additional Information*

Information, especially on union wage rates, is available from:

American Newspaper Guild,  
Research Department,  
63 Park Row,  
Room 905,  
New York 7, N. Y.

Information about opportunities with small-town papers may be obtained from:

American Press Association,  
225 W. 39th St.,  
New York, N. Y.

Names and locations of all daily newspapers are published in the Editor and Publisher's International Yearbook, available in most large newspaper offices.

People interested in operating a small newspaper will find valuable information in the following publication:

U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce. A Weekly Newspaper. U. S. Government Printing Office, Washington 25, D. C. 1946. Price 15 cents.

## Radio Announcers

(D.O.T. 0-69.21)

### *Outlook Summary*

A good many openings for announcers in the near future, but competition for openings likely to be keen, particularly in large cities. Opportunities for newcomers generally limited to small stations. Long-run employment trend upward.

### *Nature of Work*

Announcers act as masters of ceremonies on radio programs of various kinds, read commercials

and news flashes, give station identifications, describe sporting events, and do announcing of other types. Especially in small stations, they may also have a variety of other duties—playing phonograph records and other transcriptions which are being broadcast, operating some of the controls on the broadcasting equipment, writing script, even acting as station manager. Most are on the staffs of single stations or radio networks; some work for large advertising agencies. Others are not

connected with any company, but free-lance, hiring themselves out for a single job or a series of programs. A few have their own stations.

#### *How To Enter*

A well-rounded education, preferably including a college degree, is important for this occupation. Good knowledge of the English language is necessary. Other essential qualifications are a good voice and ability to deal readily with unusual situations. For jobs in telecasting, announcers must meet particularly rigid standards as to personal appearance.

Practically all new announcers begin at small radio stations. If successful there, they have a good chance of being hired by a larger station or one of the radio networks. Those who can also qualify as radio operators through holding Federal Communications Commission first-class radiotelephone licenses have an advantage in getting jobs. A few announcers become well-known and highly paid radio personalities; some advance to executive positions in the broadcast industry.

#### *Outlook*

The broadcasting industry is growing rapidly. In April 1948, there were over 1,700 standard broadcasting stations on the air, as compared with about 900 in 1945. By the end of the year, this figure will have risen to more than 2,000, and hundreds of FM stations and perhaps 50 television stations will be on the air full-time.

Around 7,000 announcers and staff program employees who did some announcing were employed in the spring of 1948. Many hundreds of additional announcers will be needed in the near future to man new stations and those established stations which are expanding their facilities, as well as to fill vacancies due to turn-over.

Employment of announcers will not increase di-

rectly with growth of FM stations, however. Most FM stations are operated in conjunction with AM stations, and the same announcers can be used for both channels. In the long run, the number of announcers employed will continue to rise. It may reach a figure several thousand higher than the current one. The greatest expansion is expected in FM and television stations, though the number of AM stations may continue to increase for at least a few more years.

Although there will be a good many openings for announcers, there is likely to be a surplus of jobseekers. As in the past, broadcasting companies, particularly in large communities, will generally be able to choose the best of many applicants. In small communities, where most announcers get their first jobs, competition for openings is likely to be much less keen than in big cities.

#### *Earnings*

According to a survey made by FCC in October 1947 regular staff announcers at stations with 15 or more employees were paid an average of about \$69 per week. Staff program employees at smaller stations (announcers were not listed separately) averaged much less, about \$46 per week. Many announcers receive talent fees in addition to regular salaries. At larger stations average hours worked per week were 41, at smaller stations about 42.

#### *Where To Go for Additional Information*

Employment offices of local broadcasting companies may be able to furnish data on job prospects, qualifications, and earnings. The magazine, *Broadcasting*, carries help-wanted and situation-wanted classified advertisements for radio announcers.

See also *Radio Operators (Broadcasting)*, page 87.

## Funeral Directors and Embalmers

(D.O.T. 0-65)

### *Outlook Summary*

New entrants seeking apprenticeship opportunities outnumber openings. Slight expansion of field expected in long run.

### *Nature of Work*

The funeral director, who may also be referred to as mortician or undertaker, makes arrangements for and conducts funerals. He interviews the family to obtain data about the deceased, so that legal requirements can be met, and helps plan the details of the funeral service. Frequently he acts as embalmer.

The embalmer prepares bodies for final disposition, in conformity with State laws and local ordinances. Preparation includes sterilizing and preserving the body by injecting embalming fluid or by other means. Embalmer may also dress the body, apply cosmetics to give a natural appearance, and restore maimed or disfigured bodies.

In 1940, there were about 38,000 employed funeral directors and embalmers; 2,000 were women. Mortuary establishments numbered about 18,000 in 1939; 1,500 were Negro-operated. Most were very small, nearly half having only one or two employees. Many funeral directors operate their own establishments with help only of family members or part-time workers.

### *How To Enter*

In all States embalmers must be licensed. Some States have a separate funeral director's license while others have a common license for both embalming and funeral directing. Most people now entering these occupations obtain the licenses needed for both types of work.

For embalmers' licenses, the usual requirements are: Minimum age of 21; good moral character; residence in State for prescribed number of years; high-school graduation (an increasing number of States require college credits); completing an embalming course; completing apprenticeship (usually a 2-year period, which may have to be served

before, after, or concurrently with the required school course); and passing an examination given by the State. Requirements for funeral directors' licenses are about the same, except that the course in embalming is not required in most States and only 1 year of apprenticeship is usually specified. There are about 25 schools of embalming, most of which give a 9- to 12-month course. Three universities offer courses in mortuary science.

### *Outlook*

Employment opportunities will be limited in the immediate future. There will be some opportunities to replace those who retire, or to go into partnership with older men. However, more people are seeking apprenticeship opportunities than there are openings. Embalming schools have been filled to capacity since the end of the war; thousands of veterans are taking training under the GI bill of rights. Many students have connections with established funeral homes run by friends or members of their families; those who do not are likely to have a hard time entering the field.

In the long run, the volume of business handled by funeral homes is likely to increase slowly. The number of deaths is expected to go on rising slowly for about the next 40 years, owing to increasing population. A few men will find opportunities to start new funeral homes, though in most localities competition from established firms will be great. Openings with the older firms will be created mainly by retirements and deaths of proprietors or employees. Since embalming schools will probably be filled for at least the next few years, outsiders may continue to have a hard time finding apprentice openings. Men who manage to find such openings and obtain licenses will have a good chance of holding their jobs over a long period of time, since declines in business activity tend to have less effect on these occupations than on many others.

Jobs are to be found in sizable communities throughout the country. For men starting a new business, selection of a good location is very im-

portant. Factors to be considered include the number of people in the locality, death rates, per capital income, and competition from established businesses.

### *Earnings*

Average earnings are not high. Nearly one-third of all mortuary establishments in 1939 had annual receipts, before deduction of any expenses, of less than \$5,000; only about 15 percent had receipts of \$25,000 or more. Typical weekly earnings of licensed embalmers now range from about \$35 to \$100; those of apprentices from \$17 to \$50.

In small establishments, earnings of owner-operators are often supplemented by income from other businesses such as furniture sales.

### *Where to Get Additional Information*

National Funeral Directors Association,  
111 W. Washington St.,  
Chicago 2, Ill.

National Selected Morticians,  
520 N. Michigan Ave.  
Chicago 11, Ill.

The State Board of Embalmers and Funeral Directors  
at any State capital.

## Dispatchers and Assistants (Air Transportation)

(D.O.T. 0-61.61)

### *Outlook Summary*

No dispatcher opportunities for outsiders; vacancies filled only by promotions or transfers from within the company, and no change in this policy foreseen. Job chances for outsiders as assistants poor in both short and long run.

### *Duties*

An air-line dispatcher (or flight superintendent) has control over all of his company's flights within his sector. He approves flight plans, authorizes take-offs, follows the progress of flights as reported by radio, and keeps captains informed of changing weather conditions and other developments affecting their flights. In addition, the dispatcher is responsible for keeping records on the aircraft and engines available, on the amount of time logged by each, and on the number of hours flown by flight personnel based at his station. He also sees to it that crew members are notified when to report for duty.

Assistant dispatchers and various grades of clerical employees aid in this work. Assistants assume such duties as securing weather information, helping to keep track of the progress of aircraft in the sector, and handling communications with the planes.

### *Where Employed*

Dispatchers and assistants are employed mainly by air lines certified by the Civil Aeronautics Board for scheduled operations. A few work for the largest nonscheduled lines. They are stationed principally at large airports in different parts of the United States. Some few are stationed abroad.

### *Qualifications*

A Civil Aeronautics Administration certificate is legally required for work as an aircraft dispatcher, though not for work as an assistant. To qualify for certification, an applicant must have been employed for at least 90 days in the 6 months prior to certification in work connected with dispatching of air-line planes under supervision of a certificated dispatcher and must meet other experience requirements. He has to pass a written examination on such subjects as the civil air regulations, aircraft characteristics, weather data and weather analysis, air-navigation facilities and principles, and airport and airway traffic procedures. He also has to demonstrate his skill in weather forecasting and certain other functions involved in dispatching.



It is air-line policy to fill dispatcher positions by promotions or transfers from within the company. Most present dispatchers were formerly employed as station managers or meteorologists by the same line and were selected as particularly adapted to dispatching work. However, outsiders are sometimes hired as assistant dispatchers and may be promoted to regular dispatcher jobs after they have had a training period of 1 to 3 years and have obtained their certificates.

For assistant jobs, 2 years of college is generally insisted on by the carriers, and men who have completed a 4-year college course—including training in mathematics, physics, chemistry, meteorology, and related subjects—are likely to receive preference. Experience in flying, weather forecasting, and business administration is particularly advantageous. Personality factors also count heavily.

### *Outlook*

Slowly rising employment of both dispatchers and assistants is expected both in the near future and over the long run, provided that general business conditions remain good. Nevertheless, dispatchers and assistants will together number only in the hundreds for many years to come. There appears in early 1948 to be no prospect of a change in the policy of filling of vacancies by promotions or transfers from within. For the occasional hiring of outsiders as assistants, employers have had at their disposal more than enough qualified applicants (from among former air-force operations officers and pilots, for example). Despite the planned air-force expansion, the potential number of such job seekers will continue to be so great relative to the probable number of openings that job chances for outsiders are almost certain to remain poor indefinitely.

### *Earnings and Working Conditions*

The monthly salaries of the bulk of dispatchers fall within a range of about \$325 to \$600 a month. Assistants generally earn less, of course—about \$250 to \$350 a month in most cases. The normal workweek is usually 40 hours. Daily hours are irregular and, on occasion, very long. Two weeks' vacation with pay is usually given to both dispatchers and assistants.



Assistant dispatchers at work in an air line dispatchers office—telephoning a CAA airways traffic-control center, entering the estimated time of arrival of a plane, and reading a teletype report on weather conditions.

The Air Line Dispatchers' Association (AFL) is the only labor organization with contracts covering dispatchers and related workers. It has negotiated agreements with 11 air lines.

### *Where To Get More Information*

Additional information on the occupation of dispatchers and assistants is given in:

U. S. Department of Labor, Bureau of Labor Statistics. *Employment Opportunities in Aviation Occupations. Part I—Postwar Employment Outlook, and Part II—Duties, Qualifications, Earnings and Working Conditions.* Bulletins Nos. 837-1 and 837-2, (1945 and 1946), Government Printing Office, Washington 25, D. C. Price 10 cents and 20 cents.

Inquiries regarding job openings should be sent to the personnel managers of the lines. Addresses are listed in part II of the bulletin just mentioned or may be obtained from:

Air Transport Association of America,  
1107 16th St. NW.,  
Washington, D. C.

*See also* Pilots, page 92; Meteorologists, page 82.

## Airport and Air-Route Traffic Controllers

(D.O.T. 0-61.60)

### *Outlook Summary*

Some openings expected in both occupations in next few years, but probably not enough for all qualified applicants. Any significant rise in employment in the immediate future may be followed by a period of relative stability. Over the longer run, however, a slow but steady rise in jobs is virtually assured.

### *Duties*

Airport traffic controllers supervise all flights within a carefully defined flight-control area around their airport. They issue directions (by radio or other means) to planes taking off, landing, and flying within the area, including instructions as to course and flying levels as well as when to take off and land. Other tasks include giving weather and position information to planes in the vicinity and keeping records of messages.

Senior controllers have responsibility for all aspects of the work. Controllers (considered to be in training for senior positions) assist them in specific duties. In their supervisory capacity, the senior controllers are also responsible for seeing that all airport lighting and all communications and other facilities are kept in good condition and that information regarding flights is regularly obtained from and relayed to airways traffic-control centers in the vicinity.

Air route (or airway) traffic controllers operate air-route traffic-control centers, which regulate air traffic on civil airways. The controllers do not communicate directly with planes but constantly receive information regarding the progress of flights and related matters from air-line dispatchers, airport traffic controllers, other control centers, and CAA communications stations. In return, instructions, advice, and information are given as to the conditions under which flights may be commenced or continued and as to the progress of flights under way. Telephone, interphone, and teletype equipment is used in transmitting these messages.

### *Where Employed*

Most airport traffic controllers work in the 140 or more towers operated by the Federal Airways Service, a division of the Federal Government's Civil Aeronautics Administration. The balance are on the pay roll of about 40 airports, which operate their own towers. The airports with towers, CAA or non-Federal, are the large fields in different parts of the country (some few outside the United States) where traffic is heavy enough to require control towers.

The Federal Airways Service is the only employer of air-route controllers. These workers are located at the various traffic-control centers scattered throughout the country.

### *Qualifications*

Entry into either of the occupations under discussion is almost always as a trainee. All permanent appointments to CAA jobs are made on the basis of competitive civil-service examinations. Pending the holding of such examinations, hiring is done directly by CAA, and successful applicants are given only temporary appointments. For the most part, the minimum standards for admission to civil-service tests for the trainee classification have been adhered to by CAA in its hiring practices. These include at present such alternative minimum experience or education as (1) 1 year's service in military aeronautical meteorological or communications work or as an air-crew member in the armed forces; (2) 9 months as a dispatcher at a military base; (3) 200 hours of flying time, plus a currently effective pilot certificate (except when the flying time was acquired in the armed services); or (4) 1 year of college credits. Positions above the level of trainee are filled mainly by promotion from within, but only CAA-certificated persons are eligible for such advancement in airport work. Rigid criteria are applied to determine fitness for the higher grades, and an airport certificate is good only for duty at a specified field.

### Outlook

In August 1948 about 1,650 airport controllers and about 1,150 air-route controllers were employed (or authorized). These totals represent substantial increases over the end-of-war levels, and the rising volume of airport construction and increasing airport and airway utilization promise further gains over the long run. Employment in these occupations is, of course, governed largely by the size of the appropriations made by Congress for the Federal Airways Service. Several recent reports by congressional and other bodies have recommended that such expenditures be increased. The planned Air Force expansion will be a favorable factor. Therefore, if general business activity and hence air traffic remain in high gear, it may be reasonable to expect a doubling of the airport and air-route staffs over the next 5 to 10 years, and further modest but steady growth thereafter.

With respect to the extensiveness of the labor supply, the flexible qualifications for the positions make it possible for the Federal Government and other employers to draw upon a wide variety of military experienced persons to meet their manpower needs: Meteorologists, communication specialists, air-crew men, and dispatchers; also upon many men and women without a military background. Considering the large numbers of persons involved in these categories and the interest shown in traffic-control jobs, fairly stiff competition can be expected for most openings.

### Earnings and Working Conditions

Like Federal workers generally, CAA employees have a basic 40-hour week. However, air-route traffic controllers often have to work 4 or 5 hours overtime in a week, which is compensated for by time off or premium pay.

Minimum salaries of CAA airport traffic controllers range from \$2,975 to \$4,480 a year, depending on the grade of job. The minimum rates for air-route controllers range from \$2,975 to \$4,526 a year. In addition, within-grade increases are given every 12 or 18 months. Other benefits of these Government jobs include 26 days of annual leave, 15 days of sick leave, and 8 holidays a year, all with pay. On the other hand, both air-



COURTESY OF CIVIL AERONAUTICS ADMINISTRATION.

An airport traffic controller giving instructions to a pilot by radio-telephone.

port and air-route controllers may have to work at night.

### Where To Get More Information

Additional information on these occupations is given in:

U. S. Department of Labor, Bureau of Labor Statistics, *Employment Opportunities in Aviation Occupations, Part I—Postwar Employment Outlook; Part 2—Duties, Qualifications, Earnings, and Working Conditions*. Bulletins Nos. 837-1 and 837-2 (1945 and 1946). U. S. Government Printing Office, Washington 25, D. C. Price 10 cents and 20 cents.

To find out more about opportunities with CAA and the exact qualifications needed, one should write to the United States Civil Aeronautics Administration, Washington 25, D. C., or to any regional office of this agency or of the United States Civil Service Commission.

See also *Ground Radio Operators and Teletypists*, page 90; *Dispatchers and Assistants*, page 114.

# Clerical, Sales, and Service Occupations

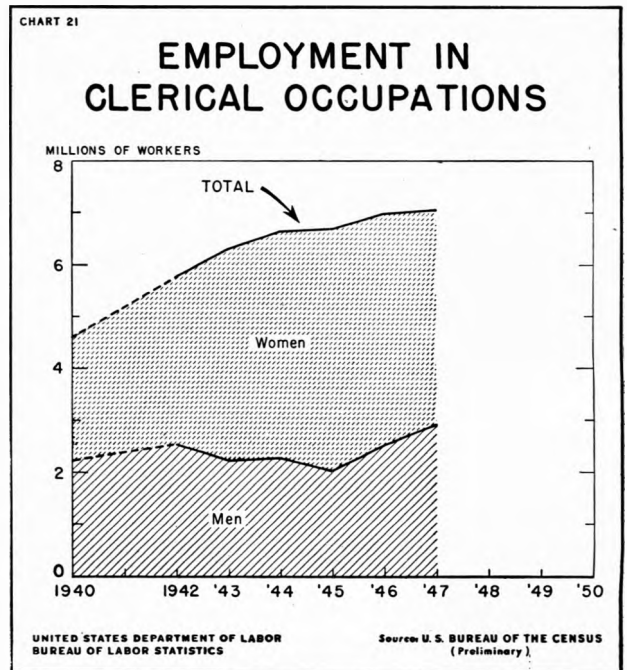
## CLERICAL OCCUPATIONS

Seventy years ago very few people were engaged in clerical work. In those days business records were kept to a minimum; letters had to be written and copied by hand and bookkeeping involved laborious copying of figures from one sheet or ledger to another.

Since then the typewriter has been introduced widely, speeding up the writing of letters and providing copies easily; adding and calculating machines, now widely used, speed up figuring; accounting machines make record-keeping easy; statistical punch-card equipment performs miracles of accuracy and speed in sorting, counting, adding, computing, and printing a vast amount of information.

One would think that such labor-saving, technological improvements would have reduced the number of clerical workers. Nevertheless, despite the introduction of these machines—perhaps even because of it—the number of clerical workers has increased more rapidly than that of any other major occupation group. Only 1 in 160 was a clerical worker in 1870; in 1930 1 in 12 was engaged in this type of work. As shown in chart 21, employment in clerical jobs gained steadily during the war, and this growth continued without interruption in the postwar period; in 1947 one employed worker in eight was engaged in a clerical occupation.

Underlying this growth has been the increasing complexity of business and Government organization. The further introduction of labor-saving business machines and more efficient procedures,



induced by the growing burden of clerical costs, may affect the future trends in this field, particularly in routine bookkeeping and clerical jobs, just as the dial telephone has cut down the employment of telephone operators and the teletype has reduced the numbers of jobs for telegraph operators. These developments may well slow down the rapid growth of the clerical occupations, but in view of their past gains and the increasing complexity of the economy it seems likely that they will continue to gain in importance for some time to come.

The major occupations in the field are shown in chart 22. Largest groups are stenographers, typists, and secretaries, and bookkeepers, accountants, and cashiers. A large number of people are also employed as shipping clerks, telephone operators, and mail carriers. Many clerical workers perform miscellaneous jobs and are not classified separately by the Bureau of the Census.

Looking at the chart, one can clearly see the wide variations in skill to be found among the occupations classified by the census as clerical. They range from accountants, who usually have several years of college or business-school training and often hold responsible positions in large firms, to messengers and office boys. Actually, accountants are often considered professional workers; certified public accountants (of whom there were about 20,000 in 1940) have been included with the professions, but the balance of accountants—perhaps as many as 200,000—were not shown separately because they are grouped with the book-

keepers in census statistics, and an accurate estimate of their number is not available.

From the point of view of a young woman considering a vocational choice, the clerical field is an important area of employment opportunity. More than a quarter of the working women are in clerical jobs—more than in any other single field—and the number of new job openings available each year is large because of turn-over. During the war there were 2,400,000 more women in clerical occupations than in 1940, while the number of men decreased. As the veterans returned to industry, the number of men in clerical occupations increased and the number of women fell, but by 1947 there were still 1,600,000 more women clerical workers than in 1940, and only about 700,000 more men.

Reports on a few occupations usually classified as clerical are included in other sections of this handbook—railroad clerks and baggagemen with the other railroad occupations, hotel clerks with the hotel occupations, and proofreaders with the printing occupations.

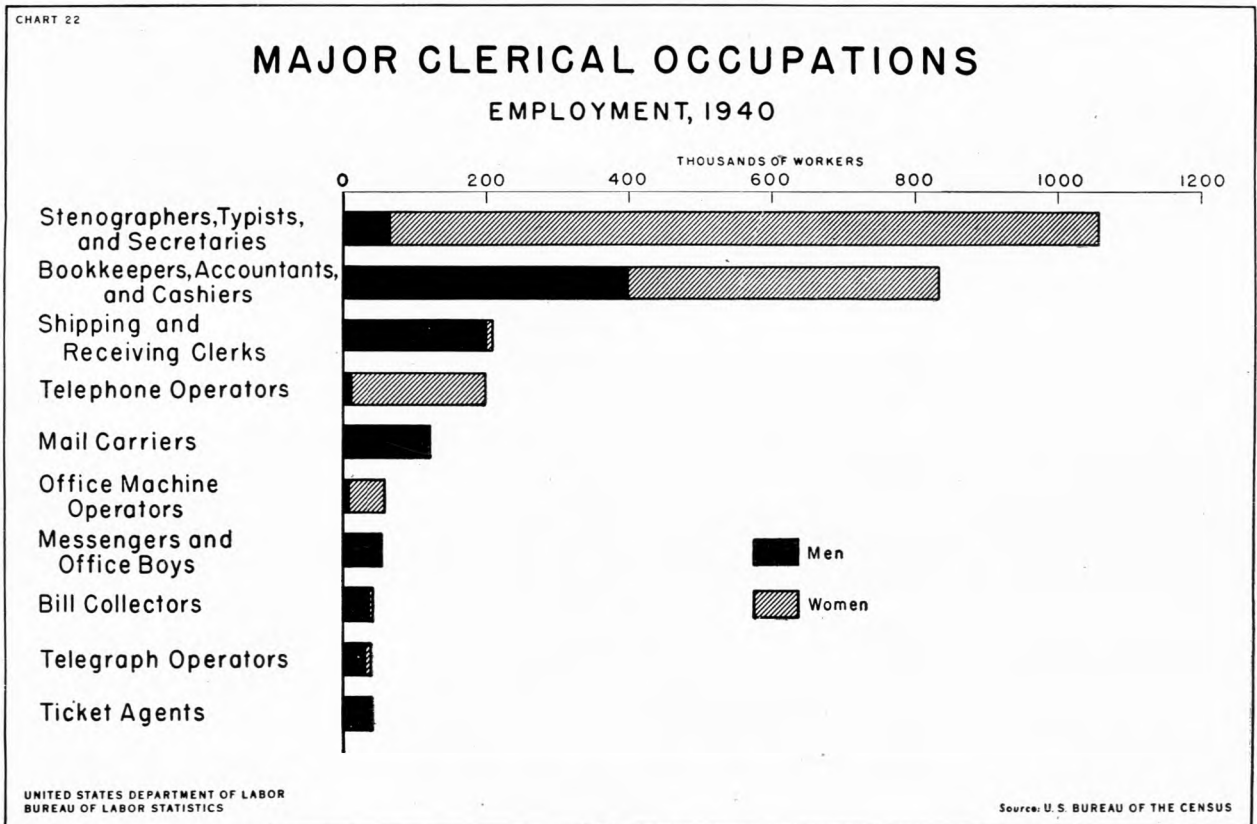
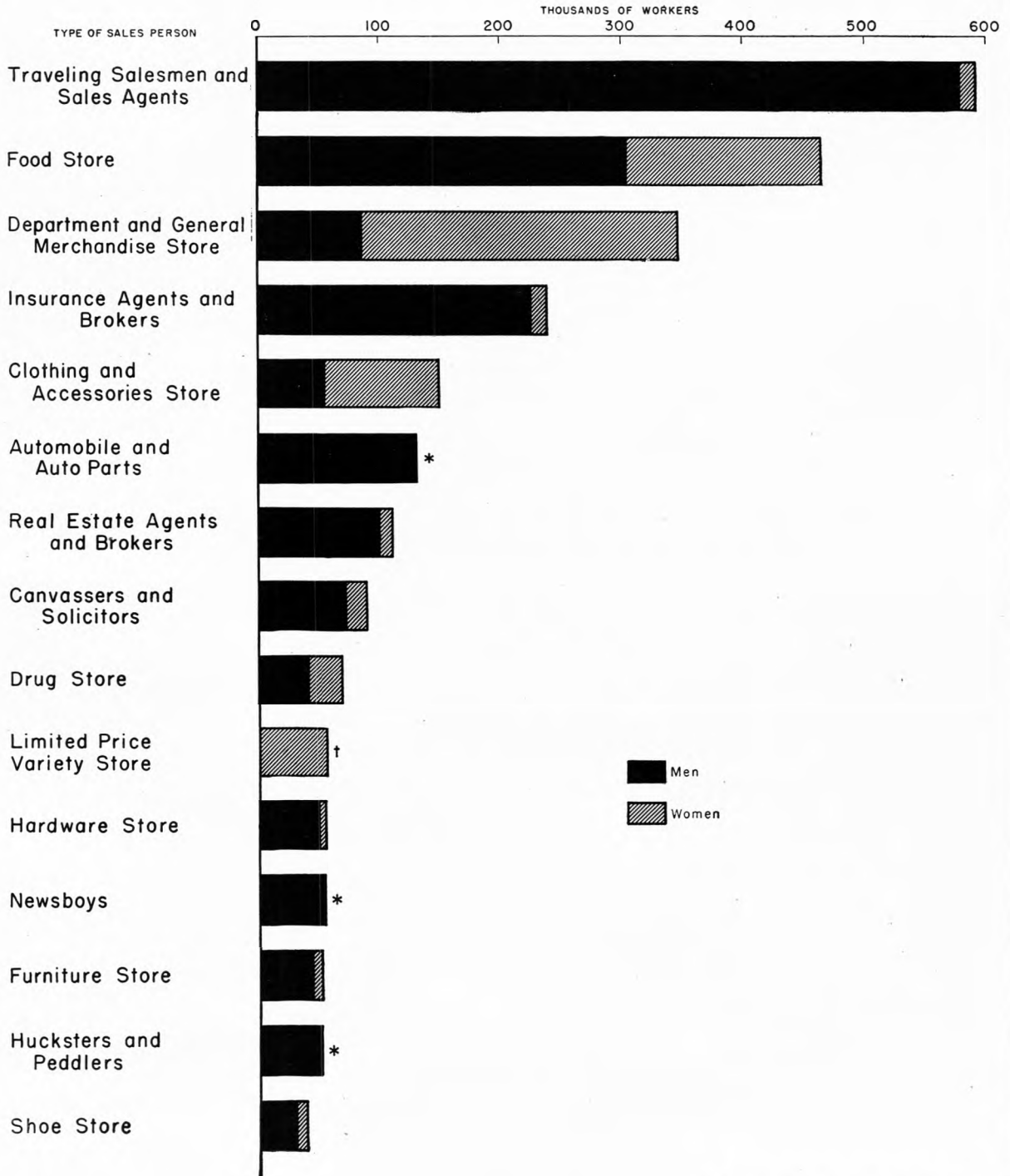


CHART 23

## MAJOR SALES OCCUPATIONS EMPLOYMENT, 1940



UNITED STATES DEPARTMENT OF LABOR  
BUREAU OF LABOR STATISTICS

† NUMBER OF MEN TOO FEW TO SHOW ON CHART  
\* NUMBER OF WOMEN TOO FEW TO SHOW ON CHART  
Source: U. S. BUREAU OF THE CENSUS

## SALES OCCUPATIONS

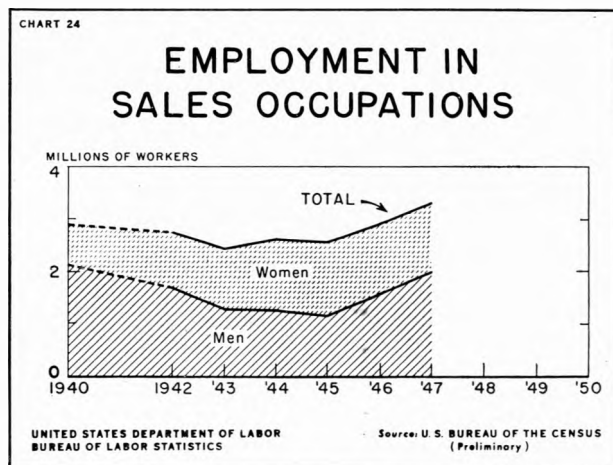
To those who enjoy meeting people, sales work offers a broad choice of opportunities. Sales occupations usually require no special training for entrance (there are important exceptions to this, however), and, while one's first job may not pay so well, experience and ability may lead to better-than-average earnings in some selling fields. Salesmen are sometimes promoted to administrative jobs, such as sales manager or department-store buyer, and can then move on up the ladder to higher executive positions.

Sales workers may be classified as "inside" and "outside" salesmen. The first group is typically employed in stores and sometimes in wholesalers' or manufacturers' sales offices. "Outside" salesmen, such as insurance agents and manufacturers' sales representatives, visit the homes or offices of prospective buyers. Some of the major sales occupations are shown in chart 23.

While special training is not required for many sales jobs, the good salesman is expected to know a great deal about his "line"—whether this be shoes, furniture, paints, hardware, or automobile parts. Experience is often the only way this knowledge can be acquired.

There has been moderate growth in employment in sales occupations in recent years. By 1940, after nearly a decade of depression, there were many people working in sales occupations simply because they had no other job.

During the war the employment of men in the selling field dropped by a million or about half, and by 1947 had not yet fully recovered to 1940 levels (chart 24). A wartime increase of a half million women was maintained in the postwar period. The exodus of men was caused in part by selective service withdrawals, but even more by the fact that in the war economy, production of furniture, automobiles, and other consumer durable goods was curtailed or eliminated; manufac-



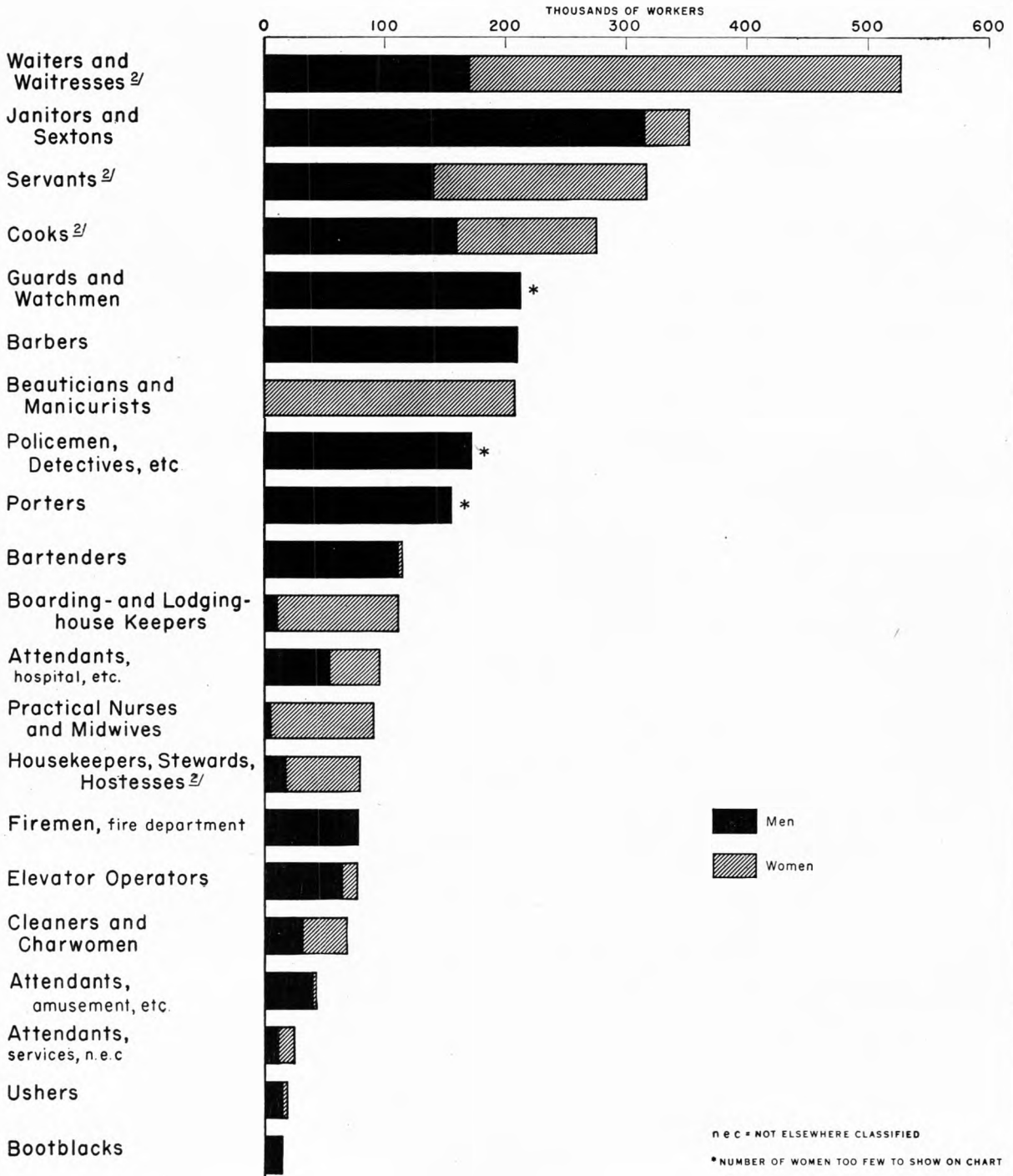
turers with Government contracts found it unnecessary to maintain large sales staffs, while manufacturers of consumers' goods, instead of having to make an effort to sell, often found buyers eagerly beating a path to their doorsteps. Moreover, difficulties in recruiting workers in some relatively low-paid sales jobs hastened the prewar trend toward self-service stores, which employ many clerical workers—such as checkers, weighers, and stock clerks—but few salespeople. Employment in sales occupations has increased only half as much since 1940 as total employment in wholesale and retail trade.

In the long run, the field of sales occupations will probably continue to grow. With the return of keener competition, additional salespeople may be hired by both manufacturers and stores. In the large field of insurance selling, a continued rise is probable with the growth of population and purchasing power. In view of the moderate growth of sales occupations in the past, however, and the continued extension of self-service stores, it does not seem likely that the number of jobs in selling will increase as much in the future as will some of the other occupational fields.

CHART 25

# MAJOR SERVICE OCCUPATIONS

## EMPLOYMENT, 1940<sup>1/</sup>



n e c = NOT ELSEWHERE CLASSIFIED

\* NUMBER OF WOMEN TOO FEW TO SHOW ON CHART

<sup>1/</sup> DOMESTIC SERVANTS OR MEMBERS OF ARMED FORCES NOT INCLUDED

<sup>2/</sup> EXCEPT THOSE EMPLOYED BY PRIVATE FAMILIES  
Source: U. S. BUREAU OF THE CENSUS

UNITED STATES DEPARTMENT OF LABOR  
BUREAU OF LABOR STATISTICS



## SERVICE OCCUPATIONS

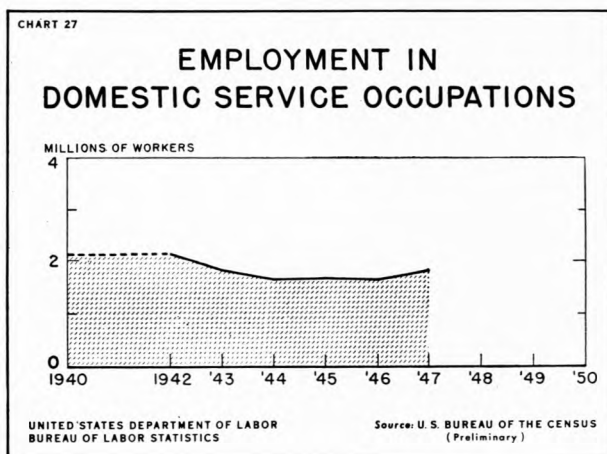
Service occupations are often referred to in glowing terms as a great and promising field of employment. This is true to some extent of service industries, as pointed out in the discussion of industrial trends (p. 24). But service occupations and service industries are not the same thing: Workers in many other types of occupations, including skilled, clerical, and professional, are employed in service industries (automobile mechanics, radio actors, and stenographers, for example), while people in service occupations are employed in many other industries (such as janitors in factories, or porters on railroad trains). The fact is that while the service industries are growing rapidly, employment in service occupations is increasing more slowly.

The major fields include domestic service, protective service, personal service, and institutional service. The occupations are shown in chart 25, and the recent trends in chart 26.

Domestic service as an occupation has been growing more slowly than the labor force as a whole. Whenever other jobs were easy to get, employment

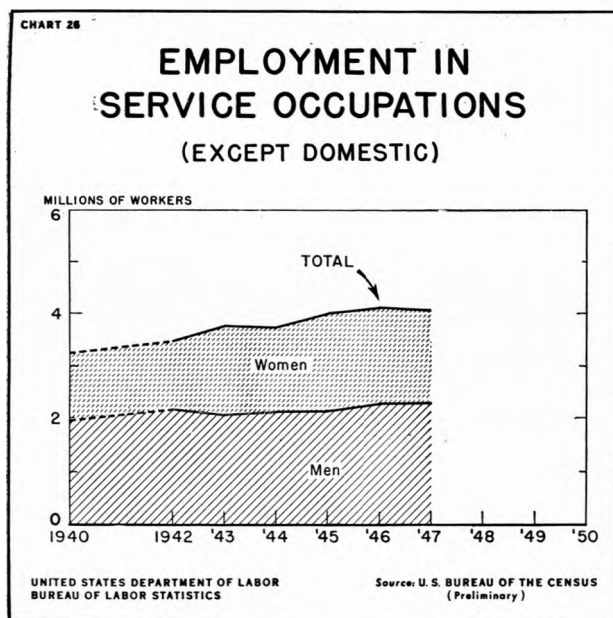
in this field declined. This was true during the recent war, as can be seen in chart 27.

The protective service occupations include mainly policemen, detectives, firemen, guards, and watchmen. Most of these are Government jobs. Largest single group is members of the armed forces, who in 1947 numbered about 1½ million. In the civilian protective service occupations the long-run employment trend is upward.



The other service occupations include personal services, such as barbers, beauty operators, and practical nurses; and institutional service occupations such as janitors, waiters, cooks, and elevator operators. Some involve a great deal of skill and training; others are comparatively unskilled. Here, too, the long-run trend is slowly upward. With higher income levels and a rising population, restaurants, hotels, barber and beauty shops, and theaters and other places of amusement should continue to furnish increasing employment opportunities. As more hospitals and large commercial and public buildings and apartment houses are built, more jobs will open for janitors, charwomen, elevator operators, and hospital attendants.

It seems likely that the service occupations as a group will grow moderately in the long run, but they are not the great and promising field of the future, as they are sometimes described.



# Hotel Occupations

The typical modern hotel in this country is not simply a lodging place but a complex organization offering many kinds of service to its guests—from providing them with food and doing their laundry to helping them get theater tickets and make travel arrangements.

To furnish these many different services, hotels employed about half a million workers in 1947. A great many different kinds of workers are employed, such as managers, clerks, skilled maintenance men, restaurant and kitchen workers, housekeepers, maids, and porters. The qualifications for these jobs are so varied that men and women with very different educational backgrounds, personalities, and skills can find jobs in the hotel industry.

## The Hotel Industry

The 28,000 hotels in the country are of three main types—transient (or commercial), residential, and resort. Commercial hotels are by far the most numerous and comprise about three-fourths of the total. Residential hotels, which

make up less than one-tenth of all hotels, let most of their rooms for relatively long periods. Commercial and residential hotels together employed about 322,000 workers during 1939—95 percent of the average annual employment figure for the entire industry.

Resort hotels—about one-sixth of the total—cater to vacationers and are open for business only part of the year. The number of people employed varies greatly from one season of the year to another: For example, in 1939, employment in such hotels was 13,000 in February—the busiest month of the southern season; it fell to 8,000 in May, rose to 38,000 in August—the month when there are the most vacationers—and then dropped to a low of 4,000 in November.

## Hotel Occupations

There are a number of different departments in large hotels. The executive department is likely to include a general manager, personnel director, publicity director, sales and advertising managers, and other executive and junior executive workers.

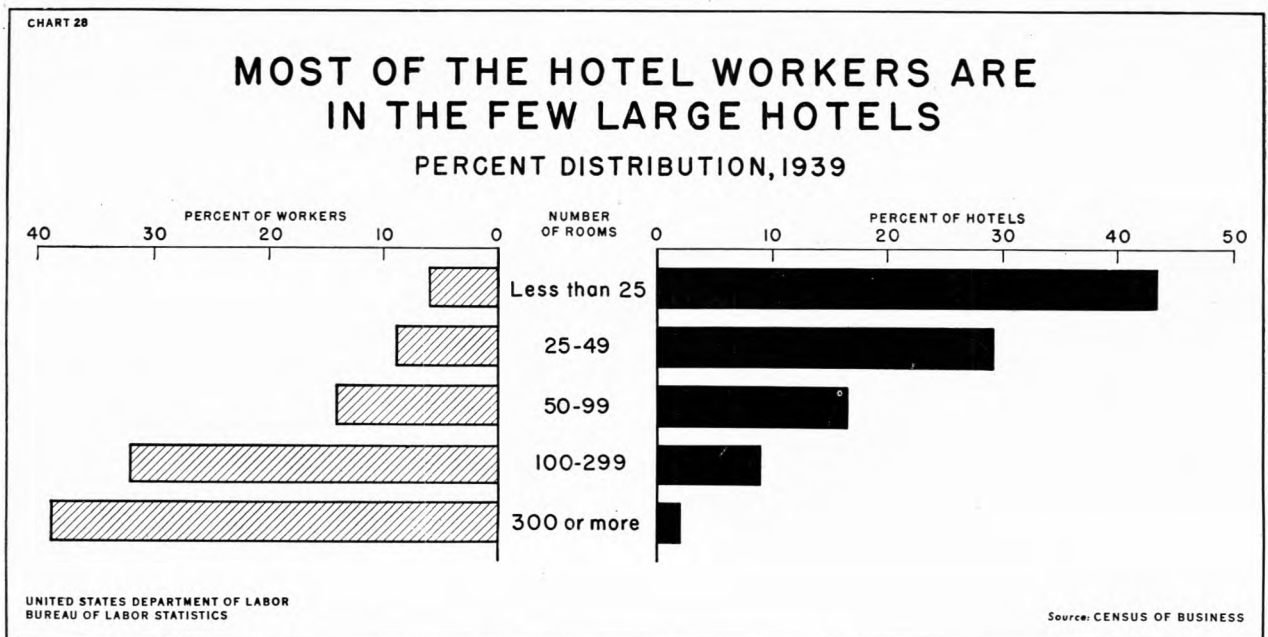
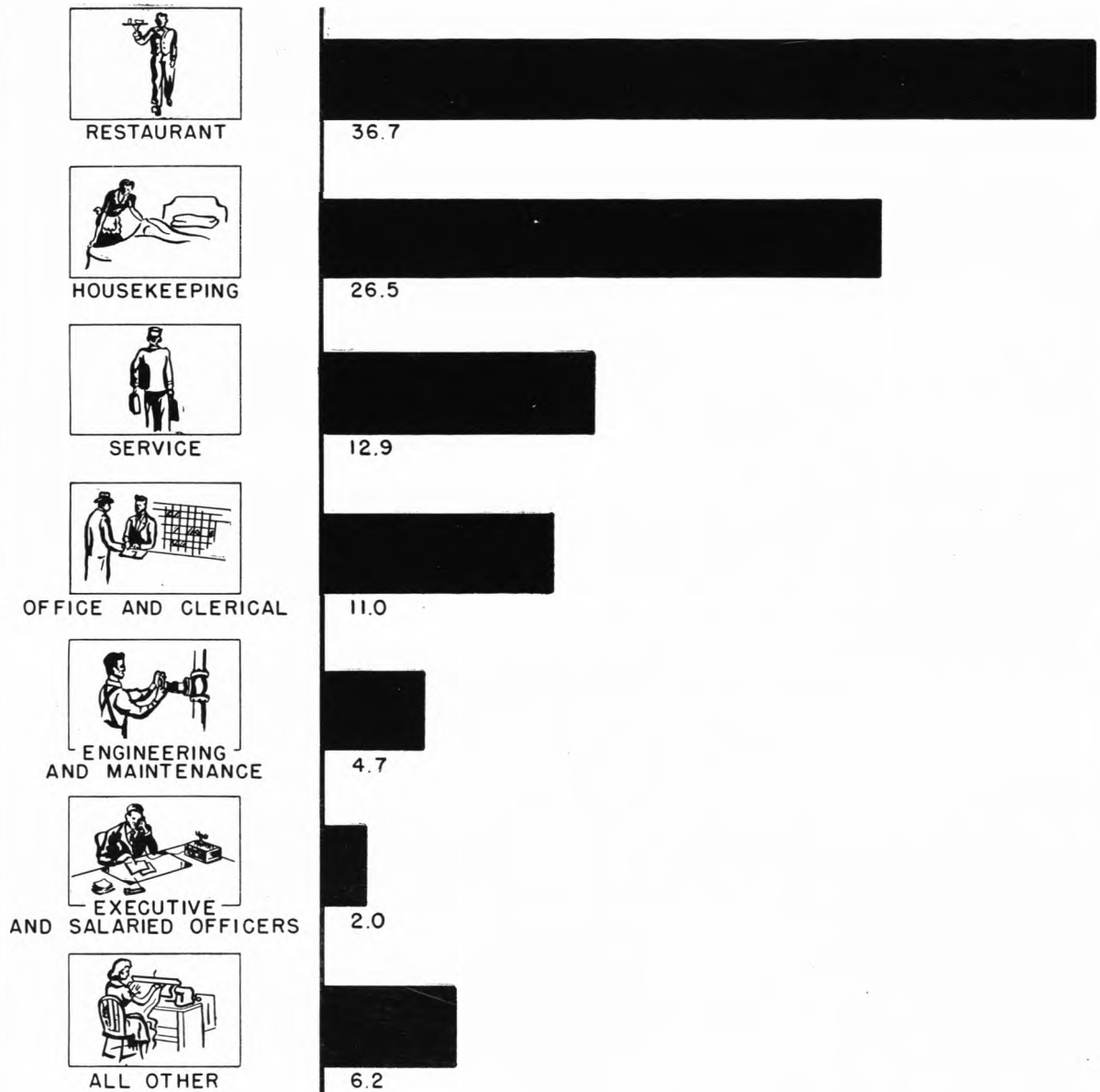


CHART 29

# RESTAURANT AND HOUSEKEEPING EMPLOYEES ARE LARGEST GROUPS OF HOTEL WORKERS

PERCENT DISTRIBUTION OF EMPLOYEES IN YEAR-ROUND HOTELS,  
BY MAJOR OCCUPATIONAL GROUPS, 1939



UNITED STATES DEPARTMENT OF LABOR  
BUREAU OF LABOR STATISTICS

Sources: CENSUS OF BUSINESS, SERVICE ESTABLISHMENTS, VOLUME III, 1939  
"HOTEL BUSINESS" - BY R T HUNTINGTON, 1940

The front office employs such workers as mail clerks, room clerks, reservation clerks, and the front-office manager. In the accounting department are auditors, bookkeepers, office-machine operators, cashiers, and other clerical workers.

The housekeeping department includes not only the housekeeper and her assistants and the chambermaids but also housemen (who do heavy cleaning), furniture polishers, seamstresses, decorators, upholsterers, and others.

Headed by the superintendent of service, the service department employs such workers as bellmen, baggage porters, elevator starters and operators, and doormen.

The restaurant department includes chefs, cooks of various kinds, and kitchen helpers; the steward and his staff—pantry-men, storeroom employees, dishwashers; and waiters, bartenders, and other food and beverage service workers.

In the maintenance department one finds such workers as stationary engineers, electricians, plumbers, carpenters, and painters.

In addition, there may be auxiliary departments which employ, for example, laundry workers, barbers, valets, and tailors.

Though small hotels do not have nearly as many separate occupations as this, practically all of them employ front-office, housekeeping, and maintenance workers, and some have restaurant workers and service employees such as bellmen.

Restaurant and barroom employees are the largest occupational group in hotels, as shown in chart 29.

Young people interested in a career in hotel work usually have to begin at the bottom of the ladder—in a job such as that of bellman, elevator operator, clerk, or maid. From these entry jobs, they may be promoted to supervisory positions, if they have the needed personality and ability. Exceptionally able and well-qualified men may advance eventually to managerial jobs, which are almost always filled by promoting workers with many years of hotel experience.

### *Trend of Employment*

Employment in hotels will probably tend to re-

main at about the present level in the near future, unless there should be a major business recession. The labor shortages which developed during the war in almost all hotel occupations have been greatly reduced but there are still openings for some types of work in some hotels as is indicated in the following occupational reports.

Additional opportunities will arise continually owing to turn-over, which is especially high among the less skilled and lower paid workers such as maids and kitchen help.

In the long run, a slow upward trend in employment in practically all hotel occupations is to be expected as population and travel increase.

Tourist camps and other lodging places will take some business away from hotels, as they were doing before the war, but the growing demand for lodgings should offset this competition in most localities as long as general business conditions continue to be good. Declines in business activity have led to sharp declines in hotel employment in the past, however, and would probably do so in the future; some occupational groups would be affected more than others. How stable employment is likely to be in different types of hotel work is one of the points discussed in the reports on individual occupations.

### *Where To Get More Information*

More information on the hotel industry, hotel occupations, and working conditions is given in:

Employment Outlook in Hotel Occupations. Bulletin No. 905. U. S. Department of Labor, Bureau of Labor Statistics, 1947. 13 pp.; illus. Price 10 cents. Superintendent of Documents, Washington 25, D. C.

Information on employment opportunities in different parts of the country may be obtained from the larger hotel chains, from big city hotels, or from State hotel associations. These associations can also supply information on schools and colleges offering courses in hotel work. Addresses of the secretaries of State associations and of all hotels and hotel chains are given in the Official Hotel Red Book and Directory, which is available at most hotels and libraries.

## Front-Office Clerks (Hotels)

(D. O. T. 1-07)

### *Outlook Summary*

Some job openings for experienced workers and also for qualified newcomers expected in near future. Long-run trend in employment slowly upward.

### *Duties*

The duties of front-office clerks in hotels include renting rooms to incoming guests; acknowledging room reservations received by telephone or mail and filing reservation cards; handling guests' complaints; issuing and receiving room keys; supplying information about arrivals and departures of guests and about local points of interest; receiving and delivering messages; and taking care of incoming mail.

In small hotels with few employees, one clerk may do all this work by himself or with the help of one or two assistants. Where there is a large staff, however, employees usually specialize in different types of work. In such cases, beginners are assigned routine jobs such as those of key clerk, information clerk, or mail clerk, and there are also higher-grade clerks with such titles as room clerk, desk clerk, or front-office manager, who supervise other clerical workers in addition to handling the more difficult and responsible work.

### *How To Enter*

Men are generally preferred for front-office clerical jobs. Openings in beginning jobs are filled sometimes by hiring inexperienced outsiders, sometimes by promoting bellmen, switchboard operators, or other workers already employed by the hotel. Positions of higher grade are usually filled by promotion from within but, in some instances, by hiring experienced clerks from other hotels. A supervisory clerk may be promoted to assistant manager and, after becoming familiar with the operation of other departments of the hotel, may possibly become general manager.

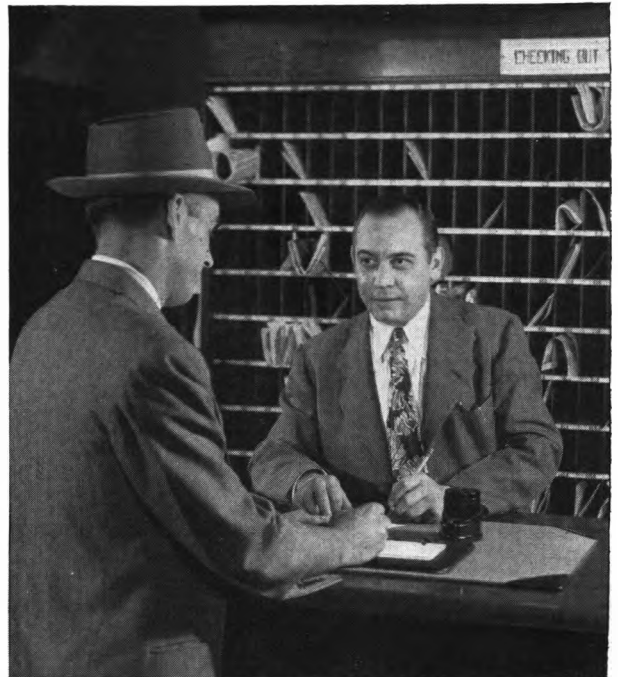
As a rule, applicants should have at least a high

school education. Completion of a 2- or 4-year college course in hotel work is becoming increasingly helpful in obtaining front-office jobs and, later, securing promotions to managerial positions. In the case of men without college training, a course in hotel work in the public schools where one is offered, is likely to be an aid in getting a job.

### *Outlook*

There will be some job opportunities in the near future, not only for experienced workers but also for newcomers who have the desired qualifications. During the war, about half of the many thousands of men employed in these occupations left for the armed forces and war industries. Although a large number of new clerks were hired, including many women, there was a shortage of help in both supervisory and lower-grade jobs. Since the end of the war, the shortage has been filled in most places, but many hotels have been anxious to re-

A room clerk helping a guest to register.



place some of the clerks hired during the war. In addition, there are always a considerable number of vacancies each year owing to turn-over. The best chance of jobs for inexperienced workers will generally be found in the bigger commercial hotels, where beginners can be assigned to specialized jobs. At least in the next few years, a large proportion of the openings will probably go to graduates of college courses in hotel work (which now have much greater enrollments than ever before).

The long-run trend in employment is slowly upward and is likely to be only slightly affected by declines in general business activity. Most of those who find jobs and prove satisfactory may therefore look forward to continued employment over a long period of time.

Although there are some jobs in all sections of the country, the greatest number are concentrated in only 10 States. Nearly one-fifth of the workers are employed in New York; another two-fifths in the following nine States: Illinois, California,

Pennsylvania, Ohio, Texas, Michigan, New Jersey, Missouri, and Florida.

### *Earnings and Hours of Work*

No up-to-date statistics on earnings in different hotel occupations are available. However, scattered information for a few large cities suggests that typical weekly salaries in beginning front-office jobs were roughly \$25 to \$35 in the early part of 1946; in higher-grade jobs, about \$35 to \$45. Earnings of head clerks tended to be somewhat higher, especially in large hotels. Generally, pay is highest in the large hotels in metropolitan centers and on the west coast.

Front-office clerks usually work 8 hours a day, 5½ or 6 days a week. Owing to the fact that hotels provide service 24 hours a day, some employees work at night.

*See also* Hotel Managers, page 133; Bellmen and Baggage Porters, page 128; Bell Captains and Head Baggage Porters, page 130; and Superintendents of Service, page 131.

## Bellmen and Baggage Porters

(D.O.T. 2-22.1 and 2-92.10)

### *Outlook Summary*

Limited number of openings in a few localities but, taking the country as a whole, occupations tend to be overcrowded. Long-run trend in employment is slowly upward.

### *Duties*

Bellmen's work includes ushering guests coming into the hotel up to their rooms and carrying their baggage, running errands, delivering messages and packages, and supplying various types of information to guests. In large hotels a separate group of employees known as baggage porters, handle the suitcases and other baggage of guests who are leaving. They also help to set up sample rooms for salesmen, supply travel information and buy transportation tickets, and arrange for shipment of express articles. The duties of bellmen are frequently combined with those of baggage porters, except in large hotels, and the worker in such

cases is generally known as a bellman. In some instances bellmen and baggage porters act as relief men in such jobs as elevator operator and switchboard operator.

### *How To Enter*

The way of entering these occupations differs from one hotel to another. Some hotels fill openings only by promoting workers already employed by the hotel—most often elevator operators and starters—whereas some hire workers with experience in other hotels. A good many hotels, especially the smaller ones, hire outsiders without previous hotel experience. In a few localities training courses for bellman jobs are given by the public schools; completion of such a course is generally helpful in obtaining work.

### *Lines of Promotion*

A man who wishes to advance from the job of

bellman may aspire to be bell captain. A baggage porter may advance to head baggage porter. From either position, the second step up is to become superintendent of service. Some workers have a chance to transfer to front-office clerical jobs, which may enable them to advance eventually to managerial positions. Moreover, both bellmen and baggage porters may increase their earnings by moving to jobs of the same kind in better-grade hotels.

### *Outlook*

These occupations tend to be overcrowded, taking the country as a whole, although there are a limited number of openings in some localities. As former workers have returned from the armed forces and war industries, many of the men hired during the war have been down-graded, usually to elevator-operator jobs, or have been laid off. Hiring standards have become much more strict.

During the next few years inexperienced men may find it difficult to get positions as bellmen or baggage porters. In general, competition for jobs will be keenest in large commercial hotels in metropolitan centers. The chance of entering the occupations will probably be best in resort hotels, and experience gained there may enable men to transfer to commercial or residential hotels. It may also be possible for beginners to find jobs in occupations such as elevator operator or houseman in which there are still shortages of workers in some areas. These jobs may lead to positions as bellmen or baggage porters in the future. The length of time it will take to be promoted will vary greatly, however, depending upon the rate of turnover in the particular hotel and the number of employees with greater seniority.

Though the long-run trend is upward, employment in these occupations is very much affected by

declines in business activity. Whether all bellmen and baggage porters will have steady employment over a long period of time will therefore depend on whether or not general business activity continues at a high level.

Jobs are found in all sections of the country, but the greatest number are in New York, where almost one-fifth of these workers are employed. Another two-fifths of the workers are employed in the following nine States: Illinois, California, Pennsylvania, Ohio, Texas, Michigan, New Jersey, Missouri, and Florida.

### *Earnings and Working Conditions*

Wages in union hotels were about \$12 to \$16 per week in early 1946, according to scattered data for some large cities. Including tips, the total amount received by many bellmen was reported to be roughly \$45 to \$60 a week; some bellmen and baggage porters who worked in very large transient hotels made as high as \$85. Earnings vary with the region, size and type of hotel, and skill of the individual worker. Generally, they are highest in very large hotels in metropolitan centers and on the west coast.

The usual work schedule is 8 hours a day, 6 days a week. Some men are on duty at night, since hotels provide service 24 hours a day.

A fairly large number of bellmen and baggage porters belong to unions. The union members are mostly in large cities outside the South. They are represented by the Hotel and Restaurant Employees' Alliance and Bartenders' International Union, AFL, and in a few places by the Building Service Employees' International Union, AFL.

*See also* Hotel Managers, page 133; Bell Captains and Head Baggage Porters, page 130; Superintendents of Service, page 131; and Front-office Clerks, page 127.

## Bell Captains and Head Baggage Porters

(D.O.T. 2-22.01 and 2-92.20)

### *Outlook Summary*

Positions practically always filled by promoting experienced bellmen and baggage porters. Opportunities for such promotion likely to be limited in near future. Long-run trend of employment slowly upward.

### *Duties*

These supervisory employees are to be found in almost all medium-sized and large hotels, though seldom in small hotels with only a few service workers. It is the bell captain's job to assign work in rotation to bellmen and to keep time records; the head baggage porter has the same responsibilities with respect to the workers in his department. Both are responsible for instructing new employees, interviewing job applicants, investigating and adjusting guests' complaints relating to the work of their departments, and deciding what action should be taken on unusual requests for service. The head baggage porter is sometimes called a transportation clerk because of his expert knowledge of train and airplane schedules. The bell captain, in addition to his other duties, may occasionally perform bellman's work.

### *How To Enter*

Bell-captain positions are usually filled by promoting one of the bellmen employed by the hotel; head baggage-porter jobs, by promoting one of the porters. Although a man may advance to the job of superintendent of service from either position, bell captains are more likely to receive this promotion than head baggage porters.

### *Outlook*

Both these occupations are small ones, employing only a few thousand workers. In both, the number of men employed declined slightly during

the war. Vacancies created by withdrawals to the armed forces and war industries could not always be filled and, often, part or all of the duties were taken over by other employees such as the superintendent of service, room clerk, or assistant manager. Most of the men who left are now back on the job, and the shortage of qualified workers has largely been met. Openings that arise in the near future will be due mainly to turn-over and will, as usual, be filled in most instances by promoting the most qualified bellmen and baggage porters. Men who obtain such promotions in year-round hotels will have a good chance of holding their positions indefinitely, since employment in these occupations is not affected very much by declines in general business activity and will probably tend to rise slowly over the long run.

The greatest number of jobs are found in New York. A large proportion of the remaining workers are employed in the following nine States: Illinois, California, Pennsylvania, Ohio, Texas, Michigan, New Jersey, Missouri, and Florida.

### *Earnings and Hours of Work*

Typical weekly wages of both bell captains and head baggage porters were roughly \$35 to \$45 in the early part of 1946, according to fragmentary data for a few large cities. Total earnings were higher, however, because of tips. The amount of money earned through tips varies considerably from one hotel to another. In general, head baggage porters make more than bell captains, because they receive larger and more frequent tips—mainly for making travel arrangements and purchasing tickets. The usual work schedule is 8 hours a day, 6 days a week.

See also *Hotel Managers*, page 133; *Bellmen and Baggage Porters*, page 128; *Superintendents of Service*, page 131; and *Front-office Clerks*, page 127.



## Superintendents of Service (Hotels)

(D.O.T. 2-25.11)

### *Outlook Summary*

Positions in this small occupation generally filled by promotions from within. Opportunities for such promotions will be very limited in near future. Long-run trend of employment slowly upward.

### *Nature of Work*

Hotel service departments include such employees as bellmen and baggage porters, elevator operators and starters, doormen, and washroom attendants. At the head of the service department in some large hotels is the superintendent of service. He hires, instructs, disciplines, and discharges employees in his department. In addition, he confers and cooperates with the people in charge of other departments—for example, the chief clerk and the housekeeper—and he may also make out the pay roll for his department. In smaller hotels, these duties are performed, as a rule, by the assistant or general manager, the room clerk, or the bell captain (who may be called working superintendent of service).

### *How To Enter*

Most superintendents of service attain this position by promotion from the job of bell captain or, less often, from that of head baggage porter. Ten years of hotel experience is necessary in many cases to become a superintendent of service. Occasionally, men transfer from this position to a front-office clerical job, with the aim of advancing eventually to a managerial position. It has also been possible in a few instances for a superintendent of service to move to a better-paying position of the same type with a larger hotel.

### *Outlook*

Employment is likely to rise slightly above the present figure, which is in the hundreds, during the next few years. During the war, a small number of men left the occupation for the armed forces and war industries. As in the case of bell captains and head baggage porters, vacancies were not always filled and employment therefore declined somewhat. With the return of most of the men who left, employment has risen again, and there is a tendency toward overcrowding in the occupation in most parts of the country. A few openings may be expected, mainly as a result of turn-over; these will, as usual, be filled in most instances by promotions from within.

The long-run trend of employment is slowly upward in the occupation, as in the hotel industry as a whole. In addition, this occupation is little affected by declines in general business activity. The small group of men who succeed in obtaining positions in year-round hotels should therefore have steady employment for many years.

The greatest number of jobs are found in New York. A large proportion of the remaining workers are employed in the following nine States: Illinois, California, Pennsylvania, Ohio, Texas, Michigan, New Jersey, Missouri, and Florida.

On the basis of scattered data for some large cities, it appears that typical wages were approximately \$40 to \$60 a week in this occupation in the early part of 1946. A few men who worked in very large hotels earned more. Tips are seldom received, but meals may be provided by the hotel. The number of hours of work per day and per week vary greatly, depending upon pressure of work.

*See also* Hotel Managers, page 133; Bellmen and Baggage Porters, page 128; Front-Office Clerks, page 127; and Bell Captains and Head Baggage Porters, page 130.

## Hotel Housekeepers and Assistants

(D.O.T. 2-25.21)

### *Outlook Summary*

Some opportunities in near future, especially in lower-grade jobs. Competition for better paying jobs likely to be keen. Long-run trend of employment slowly upward.

### *Nature of Work*

The hotel housekeeper is responsible for keeping the furnishings, rooms, and halls clean and attractive. She supervises the work of room maids, linen maids, wall and window washers, furniture polishers, housemen (who do heavy cleaning), and seamstresses. Generally, she hires and discharges employees in her department. In addition, she buys or assists in the buying of supplies, reports expenditures to the manager, makes out the pay roll for the department, takes periodic inventories of supplies, and trains new employees.

Large hotels have an executive or head housekeeper and also one or more assistant housekeepers and floor housekeepers or inspectresses. In small hotels, on the other hand, there is only one housekeeper (often called a working housekeeper) who not only handles all the supervisory duties by herself but may, in addition, do some of the work of a maid.

### *How To Enter*

Openings for housekeepers are usually filled by promotions from within the hotel or by hiring women who have performed similar work in another hotel. Positions as inspectresses or assistant housekeepers in large hotels are filled sometimes by hiring inexperienced women and giving them on-the-job training; sometimes by promoting chambermaids, linen maids, and seamstresses. From these assistant supervisory jobs, promotion to the position of housekeeper is possible. Training courses for housekeeping jobs are given by the public schools in some localities and are likely to be helpful to girls wishing to enter the occupation.

### *Outlook*

Many thousands of housekeepers and assistants are employed in the industry as a whole, and their number is likely to increase slowly, both during the next few years and in the long run. The shortage of workers which developed during the war has been much reduced since VJ-day, but there



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR.

Hotel housekeeper supervising a houseman in hanging drapes.

are still some vacancies, especially in small hotels and in lower-grade jobs. In addition, there will be hundreds of openings a year owing to turn-over. As already indicated, however, inexperienced women will be able to find jobs only as maids or, if they have the desired personal qualifications, as assistant housekeepers or inspectors. Moreover,

competition for the better paying jobs in large hotels is likely to be keen, as it was before the war.

The long-run trend of employment is upward. Women who obtain promotions to housekeeper jobs in year-round hotels should have a good chance of holding them indefinitely. Assistant housekeepers and inspectors, however, have less assurance of steady employment, since declines in general business activity affect the number of assistants needed to a much greater extent than the number of top jobs. The number of maids em-

ployed is likely to be still more affected by changing business conditions.

#### *Earnings*

Earnings of housekeepers, according to limited data for a few large cities, were about \$150 to \$350 a month in large hotels and \$75 to \$100 in small hotels in early 1946. Besides their cash pay, housekeepers and assistants are often given their meals and, sometimes, lodging. Assistant housekeepers and inspectors made less.

## Hotel Managers and Assistants

(D.O.T. 1-71.13)

### *Outlook Summary*

Some opportunities for qualified persons in the next few years, but competition for jobs will be keen. Long-run trend of employment slowly upward.

### *Nature of Work*

Over-all responsibility for the operation of a hotel rests with the manager. It is his job to see that the different departments function efficiently, so that the guests are satisfied and the greatest possible profit is made. The manager has many duties to perform, such as hiring personnel, buying or supervising the purchase of supplies, directing publicity, introducing improvements in service, and determining rates and credit policies. In large hotels, some of these duties are delegated to assistant managers. In small hotels, on the other hand, the manager—who is frequently the owner—may also do front-office clerical work.

### *How To Enter*

Advancement to the position of manager is possible from many hotel jobs, including bellman, bookkeeper, and cook, but the most common line of promotion is from the front office. To qualify for promotion to manager, it is often necessary to have a high-school education and very helpful to have college training, especially in hotel management. College-trained persons often start in such positions as room clerk, salesman, accounting clerk, store-room clerk, or, in a small hotel, as-

stant or night manager. It is possible for high-school and college-trained people to start in kitchen jobs; experience in the kitchen and steward's department is extremely valuable in qualifying for future managerial positions.

People who want to go into business for themselves as owner-operators of small hotels need good experience in hotel management and also considerable capital.

### *Outlook*

There are about 28,000 hotels in the country, the large majority of which have fewer than 50 rooms. Each of these hotels has one manager; the big hotels also have one or more assistant managers. At the present time there is a tendency toward overcrowding in these occupations. As former workers returned to their jobs from the armed forces and war industries, some of the men who had been placed in managerial positions during the war were down-graded or laid off. Men without experience in hotel management may therefore have difficulty entering the occupations in the immediate future.

In the next few years, some job opportunities will be created by the building of new hotels. In addition, there will be hundreds of job openings a year, owing to deaths, retirements, and transfers to other fields. Competition for managerial positions is keen. Therefore, only men with exceptional ability and many years of experience will be able to obtain such positions, especially in

large hotels. In general, the trend is toward filling openings by promoting college-trained persons with hotel experience, but it will still be possible for some men without such education to rise very slowly to the top jobs.

Most managers and assistant managers may look forward to continued employment over a long period of time. The long-run trend of employment is upward in these occupations. Moreover, they are relatively little affected by declines in general business activity; men in top positions have greater assurance of steady employment than do assistants.

Jobs are found in all parts of the country—in small towns as well as large cities, though mainly in the latter. About one-half of all hotel managers in the country are employed in the following

10 States: California, New York, Texas, Florida, Illinois, Pennsylvania, Washington, New Jersey, Michigan, and Missouri. Over one-third are employed in the first five of these States.

#### *Earnings*

Earnings of managers have an extremely wide range and largely depend upon the size of the hotel. In addition to a fixed salary, many managers receive a percentage of the profits and frequently living accommodations and meals for themselves and their families.

*See also:* Bellmen and Baggage Porters, page 128; Superintendents of Service, page 131; Front-Office Clerks, page 127; and Bell Captains and Head Baggage Porters, page 130.

# *Restaurant Occupations*

The custom of "eating out" has created one of this country's largest industries. During 1946, people spent more than 12 billion dollars for meals and beverages, which they ate in restaurants, hotels, dining cars, cafeterias, clubs, and a great variety of other eating and drinking places. This was about one-third of the amount spent for food consumption at home.

To serve these meals and beverages requires a great army of workers. In restaurant dining rooms are waiters and waitresses, head waiters, hostesses, bus boys, and cashiers. The kitchens have not only cooks and chefs but vegetable cleaners, dishwashers, and a variety of other kitchen helpers. Also employed in the industry are restaurant and cafeteria managers, dietitians, stewards, bartenders, countermen, and many others.

For several decades the tendency to eat meals outside one's home has been growing, and this has been reflected in an upward trend in restaurant employment. The increase in restaurant sales was greatly accelerated during the war, by rationing and food shortages and the fact that many workers who had migrated to other cities for war jobs were without cooking facilities. During the first postwar year, restaurant business continued to increase, but since then there has been a decrease in restaurant sales. However, assuming that general economic conditions remain good, there is every

reason to anticipate that the upward trend in restaurant business will be resumed and that, over the long run, this will be a slowly expanding field of employment.

The following statements describe employment opportunities in four of the industry's largest occupations: Restaurant and cafeteria managers, cooks and chefs, waiters and waitresses, and beverage-service workers.

Additional information on training, employment opportunities, earnings, and other subjects may be obtained from large hotel and restaurant chains, State hotel associations, and:

Educational Director,  
National Restaurant Association,  
666 Lake Shore Drive,  
Chicago, Ill.

The Official Hotel Red Book and Directory, which is available at most hotels and libraries, gives addresses of the secretaries of State hotel associations and of all hotels and hotel chains.

People interested in opening their own restaurants would do well to consult:

Establishing and Operating a Restaurant. U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, 1946. Price 45 cents. Superintendent of Documents, Washington 25, D. C.

## **Restaurant and Cafeteria Managers**

(D.O.T. 0-71.21 and 23)

### *Outlook Summary*

Fairly good employment prospects for experienced managers in near future. Outlook less good for people without managerial experience, though there are trainee openings in some areas. Long-run trend of employment slowly upward.

### *Duties*

The manager has over-all responsibility for the operation of a restaurant, cafeteria, or lunchroom. His duties include hiring personnel, supervising and assigning duties to employees, estimating amounts of food needed, keeping records on in-

ventories, cooperating with the chef in planning menus, handling customers' complaints, and buying equipment. In large eating places, some of these duties are delegated to one or more assistant managers. In small eating places, on the other hand, the manager may also serve as cashier or head waiter. Many restaurant owners act as managers, sometimes employing an assistant.

### *Qualifications and Training*

The minimum experience required to become a manager is generally 1 to 3 years as an assistant manager, or in some other type of restaurant work. In some of the larger restaurants, 3 to 5 years' experience is required. Some establishments hire prospective managers and assign them for brief periods to a series of different jobs, to give them a chance to learn all aspects of the business.

It is sometimes necessary to have high-school training and very helpful to have a 2- to 4-year college course in foods and restaurant management. College-trained persons often start as assistant managers in the larger eating places. A thorough knowledge of food buying and storing, food preparation, menu making, and cost accounting is essential for success. In addition, managers must understand sanitation and be qualified to make daily sanitary inspections and to fill out the required reports. General business ability is very important also.

### *Outlook*

Employment of restaurant and cafeteria managers has been rising since the end of the war, as the number of eating places has increased. Before the war (in 1939), there were almost 100,000 restaurants, cafeterias, and lunchrooms in the country, in addition to numerous other eating places in hotels, department stores, and industrial establishments. Despite a marked increase in restaurant business during the war, the number of eating places declined, and so did the number of

managers and assistant managers employed. Beginning in early 1944, however, new restaurants began to be opened in sizable numbers; many have been started since the end of the war. Though some have gone out of business, the total number of eating places in operation was higher in early 1948 than ever before. Competition for jobs has developed, however, as many former workers have returned from the armed forces and other industries and newcomers have entered the field. Inexperienced workers are therefore likely to have a hard time finding managerial positions in the immediate future. However, there may be some openings for trainees and also some opportunities for experienced managers.

Long-run trend of employment is slowly upward. Furthermore, there will be numerous openings each year owing to deaths, retirements, and transfers to other fields. Employment is, however, very much affected by declines in general business activity; many eating places are forced out of business during bad times.

Best opportunities to become managers will be found in chain restaurants and in the large independent eating places. In general, the trend is toward hiring and promoting men with schooling in restaurant management, but it will still be possible for waiters, cooks, and others without such education to qualify for this position.

Jobs are found in all parts of the country, in small towns as well as large cities, though mainly in the latter. Over one-half of the restaurants, cafeterias, and lunchrooms in 1939 were located in the following eight States: New York, California, Texas, Pennsylvania, Illinois, Ohio, Michigan, and Massachusetts.

### *Earnings*

Earnings, as would be expected, vary considerably, depending on the type, size, and location of an establishment. In a small percentage of restaurants and cafeterias, the managers are paid on a commission basis.

## Cooks and Chefs

(D.O.T. 2-26)

### *Outlook Summary*

Good prospects for skilled, all-round cooks in near future; also some openings for beginners, though demand for such workers varies considerably from one locality to another. Long-run employment trend slowly upward.

### *Nature of Work*

Cooks and chefs are employed not only in restaurants and cafeterias but in hotels, boarding houses, railroad dining cars, passenger ships, hospitals, clubs, and many other places. Those working in private homes are not covered by this report.

In eating places with a large staff, cooks usually specialize in preparing different types of food. At the head of the kitchen staff is the chef, who supervises the other cooks, often plans the menus, and sometimes buys the foodstuffs. Other workers have such titles as fry cook, roast cook, vegetable cook, sauce cook, broiler cook, dessert cook, and cold meat cook; some or all of these employees may be assisted by helpers or apprentices. In smaller establishments, however, each cook is likely to handle many different types of work; in some places, a working chef or general cook does all the work, with the help of one or two assistants. Because of the many differences in kinds of dishes served, it is not always possible for workers to transfer from one sort of eating place to another without additional training.

### *How To Enter*

An apprenticeship or equivalent on-the-job training lasting at least 3 years is generally needed to become a skilled, versatile cook. As a rule, it takes a number of additional years of training and experience to become a chef or head cook, especially in the larger and higher-grade places. The training period for the various cook specialty jobs is usually 1 to 2 years. Many people enter the

trade after serving for varying lengths of time in other kitchen jobs, such as vegetable cleaner, pot washer, and dish washer.

Preparatory training in one of the large number of vocational schools which give courses in this work is helpful. Most schools offer both full-time day courses and part-time night classes. Completion of the eighth or ninth grade is generally required for entrance, though this prerequisite may be waived in the case of veterans. Sometimes a health certificate is required.

Veterans who acquired their first experience in food preparation while in the armed forces generally have to start as lower grade cooks or helpers. Because of their experience, however, they may be able to advance more rapidly than other workers. Both men and women can find jobs as cooks. Of all cooks, chefs, and assistants employed in 1940, three-fifths were men, two-fifths women. Men hold most of the top jobs, however.

### *Outlook*

Skilled, all-round cooks are likely to have good employment opportunities in the near future. Beginners will also find some openings, but the outlook for them varies considerably from one locality to another.

A marked labor shortage developed in this occupation during the war, although shortly before (in 1940) nearly one-sixth of the 336,000 chefs, cooks, and assistants in the country were unemployed. The wartime increase in restaurant business was great; while the number of cooks employed rose also, not enough were available to keep pace with the need. Since VJ-day, many veterans and other former workers have returned to their jobs and some newcomers have entered the occupation. Moreover, the volume of restaurant business has declined from the all-time peak reached in early 1946. The labor shortage has thus been relieved to a great extent; but skilled chefs with all-round training and experience are still in demand in most communities.

For inexperienced persons, there are some openings as helpers or trainees, or in other unskilled kitchen jobs from which it may be possible to enter the trade of cook. The chance of finding such openings will be much better in some areas than others in the immediate future. In all parts of the country, opportunities for apprenticeship providing the all-round training needed for top positions are very scarce. However, the number of employers with apprentice-training programs may increase somewhat in the next few years, since the need to prepare young men to fill the places which will be left vacant by aging first cooks and chefs is becoming more and more acute.

Deaths and retirements of cooks, chefs, and assistants of all grades create around 5,000 to 6,000 vacancies each year. Additional openings arise owing to transfers to other fields of work. Furthermore, employment will probably tend to increase slowly over the long run in this as in other restaurant occupations, assuming that general economic conditions remain good. Past experience indicates, however, that restaurant business and therefore employment of cooks would be sharply affected by any major decline in general business activity.

Jobs are found in all parts of the country, in small towns as well as in big cities. However, the greatest number—about half—are in the following eight States: New York, California, Illinois, Texas, Pennsylvania, Ohio, Massachusetts, and Michigan.

#### *Earnings and Working Conditions*

There are wide differences in earnings, depending upon such factors as the worker's skill, the type of eating place, and the part of the country in which it is located. According to one estimate for late 1947, most cooks earned between \$35 and



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Specialty cooks in a large hotel kitchen

\$75 a week; executive chefs typically made from \$60 to \$100, though a few men earned considerably more. Besides their cash pay, these employees often receive one or more free meals.

Most cooks are on a 40- to 48-hour week, though working hours range from less than 40 to as many as 70 a week. In some eating places, employees are on a split shift. Unionization of cooks is most common in the larger establishments in big cities outside the South. The major union in this field is the Hotel and Restaurant Employees' and Bartenders' International Union, AFL.

*See also:* Restaurant and Cafeteria Managers, p. 135.



## Waiters and Waitresses

(D.O.T. 2-27.01-12)

### *Outlook Summary*

Good employment prospects for competent experienced workers in most localities in near future; also some openings for newcomers, particularly as bus boys and bus girls. Turn-over creates a good many thousand openings yearly in this large occupation. Long-run employment trend slowly upward.

### *Nature of Work*

Waiters and waitresses are employed in many different types of eating places, including restaurants, hotels, bars, night clubs, boarding houses, passenger ships, and railroad dining cars. In addition to taking guests' orders and serving food and beverages, they set tables, make out checks, sometimes collect payments, and handle other duties. In many eating places which do not have bus boys they also clean off the tables. Generally, higher grade establishments employ the more skilled and experienced workers. Many restaurants employ captains or hostesses, head waiters or head waitresses, who supervise the other dining-room employees and conduct guests to tables.

### *How To Enter*

One way to enter the occupation is to start as a bus boy or bus girl. Some restaurants fill waiter and waitress jobs only by promoting people from these beginning positions or hiring workers with experience in waiting on table. However, some places will take on workers without any restaurant experience, give them a few weeks' training, and then start them out waiting on a small number of guests. Still other restaurants, usually the expensive places, prefer to hire only waiters and waitresses with at least a year of experience.

Openings in supervisory jobs are usually filled by promoting or hiring experienced waiters or waitresses. Supervisory workers may sometimes advance to managerial positions.

Two-thirds of those employed in the occupation

in 1940 were women. In certain types of eating places, however, men outnumber women workers.

### *Outlook*

This is a very large occupation, employing about 525,000 men and women in 1940. Employment rose somewhat during the war, but not fast enough to keep pace with the soaring restaurant business. A shortage of waiters and waitresses therefore developed.

Since the end of the war, many former workers have returned to their jobs, and the labor shortage has diminished. Restaurants in many localities are still having difficulty finding satisfactory experienced workers, however. The need for such workers is reported to be less in New York City and on the west coast than in most other parts of the country. Openings for women are and will probably continue to be more numerous than those for men.

Inexperienced persons are in much less demand as waiters or waitresses than experienced workers, but should be able to find jobs in the occupation in some places. There are also likely to be openings for bus boys and girls in most localities and, as in the past, inexperienced workers may be able to enter the trade through these jobs.

The long-run trend of employment is slowly upward. In addition, deaths, retirements, and transfers to other occupations create a good many thousands of vacancies each year. However, employment of waiters and waitresses, as of other restaurant workers, is sharply affected by declines in general business activity.

Jobs are found in all parts of the country, in small towns as well as large cities. However, the majority of these workers are employed in the following nine States: New York, California, Illinois, Pennsylvania, Ohio, Texas, Michigan, Massachusetts, and New Jersey.

### *Earnings and Working Conditions*

Earnings in this occupation depend not only on

the wages received but also on tips, which vary considerably, depending on such factors as the skill of the worker and the type and location of the restaurant. Bus boys and girls, who ordinarily do not receive tips, are often paid slightly higher wages than the waiters and waitresses they assist. Both groups of workers receive one or more free meals a day in many cases.

Many of these employees work 48 hours a week,

though some have shorter hours and others much longer ones. Split shifts are fairly common. The work requires employees to be constantly on their feet.

Unionization is most frequent in the larger establishments in big cities outside the South. The major union in the field is the Hotel and Restaurant Employees' and Bartenders' International Union, AFL.

## Beverage-Service Workers

(D.O.T. 2-21.10)

### *Outlook Summary*

Field overcrowded and likely to remain so at least in near future.

### *Nature of Work*

These workers are employed in hotels, restaurants, and other places, such as bars, taverns, night clubs, tap rooms, and cabarets, which sell alcoholic beverages. The group includes bartenders, bar boys, cellarman, wine stewards, and bar waiters and waitresses.

Bartenders mix and serve many types of alcoholic beverage to order. In service bars, drinks prepared by the bartender are served by waiters. In public bars, bartenders also serve drinks directly to patrons and often collect payments. Bar boys perform such duties as carrying in supplies, taking out empty bottles and trash, chipping ice, washing and drying glasses, and sometimes mixing simple drinks. Wine stewards—employed only in large or high-grade establishments—are in charge of the ordering, storing, and issuing of wines and liquors; they are assisted in this work by cellarman.

### *How To Enter*

Most bartenders learn the trade through on-the-job experience. Bar boy is a beginning job, which after six or more months may lead to promotion to bartender work as helper or assistant to an experienced man; then, after perhaps another 6 months, to a regular bartender job. Sometimes a bar boy may be promoted to cellarman or bar waiter and thereafter to bartender. Schools

which give courses in this work, usually of 3 or 4 weeks' duration, are sometimes helpful; such training may enable one to start as assistant bartender.

In some of the larger establishments, a bartender may advance to head bartender and to wine steward.

### *Outlook*

The number of people seeking jobs as bartenders has been greater than the number of openings during the past 2 years. Before the war, in 1940, there were 128,000 bartenders, of whom 15,000 were unemployed. During the war, about 20 to 30 percent of the employed workers left for the armed forces and war industries. However, a still greater number of other workers, including some women, entered the occupation; consequently, employment rose. With the return of most workers who had left, the occupation has again become overcrowded; many workers hired during the war have had to be laid off, even though employment has remained above prewar levels.

There will be some openings each year, owing to deaths, retirements, and withdrawals to other fields. At least in the immediate future, however, most of these jobs will be filled by hiring experienced bartenders who are out of work. Generally, the best chance of jobs for less skilled bartenders will be in service bars, since highly skilled men with many years of experience are preferred in public bars, especially in the better-grade establishments. Jobs for assistant bartenders will generally be found only in the larger establishments.

Some experienced bartenders may be able to open and succeed in their own business.

There are some openings as bar boys, but advancement to bartender will generally be very difficult at least in the next 3 to 5 years. The best chance of finding employment as bar boys will be in the larger establishments. There will be few job opportunities for cellarmen and wine stewards, since both of these occupations are very small.

The long-run trend of employment in eating and drinking places is slowly upward. However, employment of beverage service workers is sharply affected by economic conditions as well as many other factors.

Jobs are to be found in many sections of the country, in small towns as well as large cities, but the greatest number are in New York. Other States with large numbers of employees are Illinois, Pennsylvania, California, and New Jersey. Together, these five States employ roughly half of the workers in this field. Serving of alcoholic

beverages is prohibited in numerous counties throughout the country.

#### *Earnings and Working Conditions*

Typical wages of bartenders were about \$40 to \$60 a week in some large cities in early 1946; those of assistant bartenders about \$30 to \$40 and those of bar boys around \$20 to \$25. Wage increases since 1946 have been slight in most cases. Total earnings of bartenders employed in public bars are sometimes much above these figures, because of tips. The amount of money earned through tips, however, varies considerably from one establishment to another. Meals and uniforms are furnished by the employer in many establishments. The usual work schedule is 8 hours a day, 6 days a week.

Unionization is fairly common except in the South, the major union organizing these workers is the Hotel and Restaurant Employees' and Bartenders' International Union, AFL.

*See also: Waiters and Waitresses, page 139.*

# Protective Service Occupations

## Policemen

(D.O.T. 2-66.20 to .29)

### *Outlook Summary*

Expanding field. Room for several thousands of newcomers each year.

### *Nature of Work*

Most policemen are city employees, though many work for counties and States. Those employed by the Federal Government are not covered by this statement but are discussed separately (see p. 144).

Policemen usually wear uniforms. In large cities, they are assigned to a particular type of work, such as walking a beat, accident or crime prevention, dance- or pool-hall inspection, traffic patrol, motorcycle or mounted patrol, harbor patrol, homicide squad, or radio operation. Police-women are assigned mainly to crime prevention and detection work among women, young people, and children. County and State police and those in smaller communities usually have more diversified work.

### *Qualifications, Training, and Advancement*

In many cities, especially large ones, the jobs are filled on the basis of competitive examinations. In such cities, job seekers may have to meet very rigid requirements, especially with respect to age, height, health, strength, agility, and physical endurance. Applicants must have sufficient education to meet basic requirements. There has been and will probably continue to be a strong tendency to raise hiring standards for police jobs, and examinations are becoming increasingly difficult. Veterans, especially those with military police training and experience, are likely to have an advantage over other applicants. For most police jobs, applicants must meet residence requirements.

Many police departments have training programs for new recruits and also provide in-service training for men already on the force. The num-

ber of communities with such programs is growing, as a result, mainly, of increasing emphasis on crime prevention and traffic control.

From beginning police jobs, opportunity for advancement to sergeant or detective is fair—better in large and medium-sized cities than in small communities. From either of these positions, advancement to lieutenant, then to captain, is possible, and on up the ladder. In most large cities, promotions up to the rank of captain are made on the basis of competitive examinations. Appointment to a higher grade (inspector, deputy chief, chief, and commissioner) is usually made without examination.

### *Outlook*

Police work is an expanding field. Early 1948 employment was estimated to be about 10 percent above the immediate prewar (1940) level, when about 96,000 nonranking policemen, including about 1,000 women, held jobs. During the war, police departments lost thousands of men to the armed forces and war industries and were unable to get enough replacements. Although many veterans and others have now returned to their jobs, some departments still have shortages of qualified applicants. In addition, the shorter workweeks which are being put into effect in more and more cities are making it necessary to increase personnel. To meet these needs, make replacements for normal turn-over, and cope with the rising crime rate, several thousand newcomers will be required each year for several years. However, many departments already have people in line for appointment or have applications on file.

Over the long run, there will probably continue to be sizable numbers of openings, owing to turn-over and the upward trend in employment. But competition for jobs is likely to be keen in many localities.

Geographically, opportunities are widespread. All but the smallest communities will probably have at least a few openings each year. Most opportunities are in big cities, where there are not only more policemen in proportion to population than in small cities but also higher turn-over rates. On the other hand, competition for the available jobs is likely to be stiffer in large than in small communities.

#### *Earnings and Working Conditions*

Base starting salaries of city policemen are generally over \$2,000 per year; they range up to \$3,200 in a few large cities. In many places, extra compensation has been awarded, usually in the form of a cost-of-living adjustment. Earnings vary not only with the size of the community but with the region of the country. Automatic pay raises are frequently provided. In large cities, these usually amount to \$500 to \$700 over a period of about 5 years; thereafter, advancement in earnings is almost always through advancement in rank only.

The predominant work schedule for city police is 8 hours a day and 48 hours a week. In several large cities the workweek has recently been cut to 40 hours. State police generally live in barracks, are on call 24 hours a day, and often work more than 60 hours a week. Policemen have unusually secure jobs and stable earnings, paid vacations, better-than-average retirement pensions, and other benefits.

#### *Where To Go for More Information*

Information on employment opportunities and requirements in a particular locality may be obtained from the chief or personnel officer of the local police department or, where there is a local civil-service commission, from this commission. Inquiries with regard to opportunities in the Metropolitan Police force of Washington, D. C., should be addressed to United States Civil Service Commission, Washington 25, D. C.

*See also* Federal Police and Detectives, page 144; FBI Agents, page 145; and Detectives, page 143.

## Detectives

(D.O.T. 2-66.11)

#### *Outlook Summary*

Detective positions practically always filled by promotion or transfer of uniformed policemen. A good many opportunities for such promotions expected in next couple of years. Long-run employment trend slowly upward.

#### *Nature of Work*

Detectives are plain-clothes men and women. The large majority are city employees, though many work for States and counties. Men are usually assigned to investigate crimes of a particular type, such as homicides, burglaries, robberies, illegal use and sale of narcotics, forgeries, illegal pawn shop activities, or pocket-picking. Women detectives—of whom there are very few—generally do crime prevention and detection work among women, young people, and children.

#### *How To Enter*

Detective positions are practically always filled by promotions or transfers of uniformed police. Both personal qualifications and length of service in uniform are considered in selecting personnel for detective positions. In many places, especially large cities, the positions are covered by a merit system, and in most of these cities written examinations are given. Some police departments have apprenticeship periods for new detectives, though many provide no introductory training.

#### *Outlook*

There will be a considerable number of opportunities for appointment to detective jobs in the next couple of years. Before the war, in 1940, there were about 10,000 detectives in the fields covered by this statement. During the war, many

entered the armed forces, but more promotions and transfers than usual were made to provide replacements. In the country as a whole, employment remained at about the prewar level through VE-day and then began to rise as former employees returned from the armed services. The total number of detectives employed is now greater than ever before and will probably continue to increase for another year or two because of the trend toward a shorter workweek and needs created by the mounting crime rate and increasing emphasis on crime prevention and scientific detection. However, as already indicated, practically all personnel will be obtained from the uniformed forces.

After 1949 employment may level off temporarily, but eventually it will, in all likelihood, resume its long-run upward trend. On the other hand, hiring standards will probably become stiffer and competition for detective positions will remain sharp. Geographically, opportunities are

widespread, with big cities likely to have proportionately more openings than small ones.

### *Earnings and Working Conditions*

Detectives usually have the same salary rates as uniformed men at the same grade levels. Their starting salaries are over \$2,000 per year in most cities and range as high as \$3,200 a year in a few large ones. In many places extra compensation has been awarded, usually in the form of a cost-of-living adjustment. Detectives in some localities are allowed expense accounts for extra costs incident to their work.

Opportunities for advancement to higher grade positions are excellent for men with the needed experience, efficiency, and other qualifications.

Detectives have unusually steady employment and stable earnings, paid vacations, better-than-average retirement pensions, and other benefits.

*See also* Policemen, page 142; Federal Police and Detectives, page 144; and FBI Agents, page 145.

## Federal Police and Detectives

(D.O.T. 2-66.99)

### *Outlook Summary*

Some few openings in prospect. Civil-service examinations to be given in 1948 or soon thereafter will determine eligibility of applicants for several years.

### *Nature of Work*

Police and detectives referred to in this statement are employed by the Bureau of Customs, United States Secret Service, Bureau of Internal Revenue, and Bureau of Narcotics, all of which are in the Treasury Department; by the national defense agencies; and by some other Federal agencies. Excluded from the statement are FBI agents (see p. 145), ordinary building guards and watchmen, and unarmed investigators.

Some Federal police are uniformed; others are plain-clothes men. Their duties depend on the agency in which they are employed and their particular assignment. Some guard the borders and ports of the United States (Bureau of Customs, and Immigration and Naturalization Service); protect the President and President-elect

and their families and property and visiting foreign dignitaries (Secret Service); or guard Government property, especially military and naval establishments (Army and Navy Departments). Other groups enforce certain Federal laws—for example, those regarding counterfeiting (Secret Service), narcotic trade (Bureau of Narcotics), and tax collection (Intelligence and Alcohol Tax Units of the Bureau of Internal Revenue). The work often involves tracking down criminals and making arrests. Job titles include border patrolman, customs agent, port patrol officer, secret service agent, customs patrol inspector, special agent, patrolman, and narcotics agent.

### *How To Enter*

All these positions are in the Federal civil service. Permanent appointments of people who do not already have civil-service status are made only from registers established on the basis of competitive examinations given by the United States Civil Service Commission.

To be admitted to examinations for agent posi-

tions in the Treasury Department, applicants must have some college training or experience in investigative work. Veterans are given 5 or 10 points' preference in the grading of all examinations. In addition, there are restrictions on appointment of nonveterans to certain classes of positions. Physical requirements are strict—more so for some kinds of jobs than others.

Newly hired employees receive on-the-job training and classroom instruction for periods varying from several weeks to about a year.

### *Outlook*

This is not a large field of employment. The Treasury Department has some 3,000 agents, and around the same number are employed by other agencies.

During 1948, or soon thereafter, the Civil Service Commission will give examinations for Treasury Department positions and those in other agencies. From the resulting registers of qualified persons appointments will be made to fill the small number of current vacancies. At the same time, the positions now held by war-service appointees will be filled on a permanent basis, but it is expected that many of the present employees will qualify for appointment.

Not much expansion in employment is anticipated. Though the long-run trend in employment has been upward, the peak may have been reached during the war. There will, however, be a few job opportunities each year as a result of normal replacement needs. These vacancies will of course be filled from the civil-service registers. Veterans will generally have much the best chance for appointment; those with experience in

military intelligence work will have a special advantage.

### *Earnings*

The starting salary is generally a little over \$3,200 a year for men without experience and about \$4,000 a year for those with related experience. Within-grade pay increases are given at regular intervals, as in other Federal jobs. A salary of about \$4,700 a year is considered the "journeyman" rate for Treasury agents. Opportunity for advancement to supervisory positions with still higher pay usually comes only after many years of experience.

These men have unusually steady employment and stable earnings, paid vacations, sick leave, better-than-average pensions, and other benefits.

### *Where To Go for More Information*

Inquiries about examinations and appointments should be made at regional offices of the United States Civil Service Commission, but only when recruiting or examination announcement has been made. Such announcements are published in the newspapers and posted in Civil Service Commission offices, post offices, and other places. The Commission has regional offices in the following cities:

Boston, Mass.	St. Paul, Minn.
New York, N. Y.	St. Louis, Mo.
Philadelphia, Pa.	New Orleans, La.
Washington, D. C.	Seattle, Wash.
Atlanta, Ga.	San Francisco, Calif.
Cincinnati, Ohio	Denver, Colo.
Chicago, Ill.	Dallas, Tex.

See also FBI Agents, page 145; Policemen, page 142; and Detectives, page 143.

## FBI Agents

(D.O.T. 2-66.99)

### *Outlook Summary*

Some openings each year owing to turn-over, though not nearly enough for all job seekers. Applications are welcomed, especially from qualified veterans.

### *Nature of Work*

FBI (Federal Bureau of Investigation) agents are plain-clothes men. They investigate all types of violations of Federal law not specifically assigned to other agencies, including antitrust vio-

lations, bribery, fraud against the Government, bank robbery, kidnaping, white-slave traffic, motor-vehicle theft, espionage, and sabotage.

#### *How To Enter*

The FBI, part of the United States Department of Justice, hires its agents directly (not through the U. S. Civil Service Commission). Applicants must be (1) graduates of accredited law schools, or (2) graduates of accredited accounting schools. They must also be male citizens of the United States, between the ages of 25 and 41 years, and willing to serve anywhere in the United States or its Territories. Furthermore, they must be at least 5 feet 7 inches tall; have unimpaired hearing, excellent vision, and normal color perception; be capable of strenuous exertion; and have no physical defects which would prevent use of firearms or participation in dangerous assignments.

Written and oral examinations are given, covering law, accounting, and aptitude for meeting the public and conducting investigations. Exhaustive background and character investigations are conducted on applicants prior to appointment.

#### *Outlook*

Employment in early 1948 was about 3,500. At least this many men will doubtless be needed in the next few years to combat the sharply increased crime rate and to discharge the Bureau's various responsibilities. Turn-over, although small, should make some vacancies, and if prewar experience is any indication, the number of agents employed will rise slowly in the long run. However, the number of interested applicants will prob-

ably far exceed the number of available jobs. The FBI nevertheless, welcomes applicant inquiries, particularly from qualified veterans and interviews plus the opportunity to file applications are afforded.

#### *Earnings and Working Conditions*

All agents start at \$4,856 a year. Periodic within-grade pay increases are given, as in all Federal agencies. Opportunities for advancement to higher-grade positions are excellent for men with the needed experience, efficiency, and other qualifications. Top pay for regular field agents is \$7,193 a year.

The basic workweek is 40 hours, but all agents are on call 24 hours a day, 7 days a week. Though assigned to one of the many FBI offices in different parts of the country, agents may be called upon at any time to handle jobs requiring travel outside their headquarters city. A subsistence allowance of \$6 per day is paid for work away from this city. Transportation of families and shipment of household effects are at Government expense on official transfers.

FBI men have paid vacations and sick leave, relatively secure employment and stable earnings, and pensions on retirement.

#### *Where To Go for More Information*

Additional information and application forms may be obtained by writing to:

Personnel Office, FBI  
Room 7204  
U. S. Department of Justice Bldg.  
Washington 25, D. C.

*See also* Policemen, page 142; Detectives, page 143; and Federal Police and Detectives, page 144.



# *Other Clerical, Sales, and Service Occupations*

## **Secretaries, Stenographers, and Typists**

(D.O.T. 1-33; 1-37.12, .14, .18, and .32)

### *Outlook Summary*

Good employment prospects in immediate future for well-trained workers. Long-run employment trend upward.

### *Nature of Work*

Typists' work ranges from simple copying to reproducing complicated statistical tables and manuscripts. Stenographers, besides typing, take dictation in shorthand or on a stenotype machine. Some become specialists in public or court stenography, foreign languages, or legal or police work. Secretaries usually handle stenographic duties along with business details which do not need their employer's personal attention. Some specialize in legal, medical, private, social, or other types of secretarial work.

Over 1,000,000 persons were employed in these occupations in 1940. The number increased greatly during the war; it may now be as high as 2,000,000, according to a rough estimate. The great majority of the workers (94 percent in 1940) are women. Nevertheless, a good many men are employed (about 69,000 in 1940) in stenographic jobs with finance, insurance, and real-estate companies. Court stenographers are usually men, although some women stenotypists are employed.

### *How To Enter*

At least a high-school diploma and preferably also one from a business school or college are needed to enter these occupations. Typists need good training not only in typing but in spelling, vocabulary, punctuation, grammar, and correspondence procedures; stenographers must also be able to take dictation quickly and accurately; court stenography requires exceptionally high speed. Ability to use other office machines and courses in business administration are helpful for many jobs. The better-paid positions often require

knowledge of the fundamentals and terminology of a particular field, such as law, medicine, engineering, or foreign languages.

Starting out as a typist, a person with ability and training can advance to stenographic, secretarial, and administrative assistant positions. Specialized knowledge of the particular industry where one is employed is most helpful for advancement.

### *Outlook*

Employment prospects are good for well-trained secretaries, stenographers, and typists. In early 1948 there was a shortage of such workers, owing to the withdrawal of many young women from the labor force since VJ-day, to the fact that the number of young people completing training was less than usual during the war, and to the continuing high levels of business activity. However, the shortage is likely to become less acute as the great numbers of young people currently enrolled in business courses complete their training. Poorly trained people will therefore find it increasingly difficult to get jobs. Since the end of the war, employers have become more insistent upon hiring only those people with thorough stenographic training. Veterans' preference will generally be a great help in obtaining Government jobs.

In the long run, employment will probably tend to rise slowly. In addition, high turn-over rates, usual in occupations where young women predominate, will continue to create many job openings. Since these workers are needed in every industry and profession, they are likely to be less seriously affected by declines in economic activity than those in occupations found in only one industry. Well-trained stenographers and secretaries have a better chance of holding their jobs than typists with only one skill to offer.

Jobs will be found in most sections of the coun-

try, in small towns as well as large cities. The greatest number of openings, but also keenest competition for jobs, will be in large industrial and population centers. About three-fifths of the workers in 1940 were employed in 8 States: New York, Illinois, Pennsylvania, California, Ohio, New Jersey, Massachusetts, and Michigan.

### *Earnings*

At the beginning of 1948, average weekly salaries of women general stenographers in private industry ranged from \$37 in Boston to \$48 in San Francisco, with an average for all cities of about \$40, according to a survey of 11 large cities. Earnings of the small number of men engaged in this work were somewhat higher, as were earnings of technical stenographers working in such specialized fields as law or medicine. Junior typists had an average of \$30 to \$42 a week depending on the city where employed. For senior typists the median salaries ranged from \$37 to \$47 weekly.

In the Federal civil service, typists have an annual starting salary of \$2,086 or \$2,284; stenographers start at \$2,284. Stenographers may ad-

vance to secretarial and administrative assistant jobs, which pay higher salaries. Court stenographers in the Federal service begin at \$3,351. State and local governments generally have somewhat lower salary scales than the Federal Government.

### *Where To Go for Further Information*

More data on schools may be obtained from:

National Council of Business Schools,  
839 17th St. NW.,  
Washington, D. C.

Information on salaries, hours of work, and supplementary benefits for office workers in 11 large cities are available from:

U. S. Department of Labor,  
Bureau of Labor Statistics,  
Washington 25, D. C.

Information on Government jobs may be obtained from State or municipal civil-service authorities or the United States Civil Service Commission, Washington 25, D. C.

Notices of civil-service jobs and examinations are very frequently posted in local post offices.

## Bookkeepers

(D.O.T. 1-01.02, 1-01.03; 1-02.01, .02, .03)

### *Outlook Summary*

Many openings at present for bookkeeping clerks and machine operators; some opportunities at higher levels. Keen competition probable in long run.

### *Nature of Work*

Jobs in bookkeeping range from entry positions as clerk or machine operator up to head bookkeeper. Bookkeeping clerks perform routine tasks such as recording and posting items by hand; in small businesses, they may also perform related duties such as typing, filing, answering the telephone, and mailing statements. Bookkeeping-machine operators may use relatively simple machines to record only one type of data or may perform involved computations on special machines.

General bookkeepers keep complete and system-

atic sets of records of their employers' business transactions, recording items in proper journal and on special forms, balancing books and compiling reports. In large establishments which employ many office workers, a bookkeeper may be assigned to work with one phase or section of a complete set of records, as accounts payable or accounts receivable. The head bookkeeper in a large office has full responsibility for his department.

### *Training*

Most employers require graduation from a high school, business or vocational school, or junior college. However, many employers prefer not to hire college-trained persons for routine bookkeeping jobs. A commercial course which includes training in many office functions such as typing, shorthand, and use of various office machines, as well

as bookkeeping procedures, will usually be of greatest value in obtaining a job in this field. Head bookkeepers usually qualify either by education in accounting or extensive experience.

### *Where Employed*

Bookkeepers are employed in all industries, with by far the greatest numbers in wholesale and retail trade. Many employment opportunities are found with banks, insurance companies, railroads, and utility companies.

### *Outlook*

There are a large number of openings in bookkeeping jobs at the present time (early 1948), owing chiefly to the high level of business activity and the high rate of turn-over within the occupation. There is a trend, especially in large offices, toward breaking down bookkeeping functions into office-machine operator and other routine clerical jobs. The vast majority of openings in the bookkeeping field are of this nature. While there are plenty of people with the qualifications to fill such positions, many are loath to accept them because of the low salaries usually paid. Openings for bookkeepers who are required to assume responsibility for a complete set of books are few; even so, there is now a shortage of workers with the necessary training and experience to qualify for these jobs. However, there are large numbers now taking business courses and accounting training, and it is likely that the supply will soon exceed the demand.

The long-run outlook for bookkeepers depends, in the main, on the level of business activity and the number of individual businesses. It is likely that, if general business conditions remain good, there will be some increase in the need for bookkeepers, because the growth of scientific management in industry, complex tax systems, and the general complexities of the economy necessitate more record keeping. In the event of a slump in business activity the competition for jobs will be

great because of the low training requirements for entrance in the occupation.

The greatest source of job openings for bookkeepers will continue to be the result of turn-over which is considerable in this large field. The number of persons employed in bookkeeping jobs probably exceeds 700,000. Nearly half of these jobs are filled by women, about 50 percent of whom are under 30 years of age. Many of these women leave their jobs each year, thus creating openings for new employees.

### *Earnings*

Earnings vary greatly, depending on the industry, type and location of office, and grade of job performed; also with the education, experience, age, and sex of the worker. In general, earnings are highest in large cities and in the Pacific and Middle Atlantic States. Men usually receive higher pay than women in the same offices.

In the early part of 1948, average weekly earnings of women hand bookkeepers in private industry ranged from \$44 in Buffalo and Atlanta to \$55 in New York City and San Francisco according to a survey of office workers in 11 large cities. In nearly all cities, hand bookkeepers received higher pay than workers in any other office occupation. Women bookkeeping machine operators with highest skills averaged from \$42 to \$52 weekly, while operators with less responsibility had average salaries of \$34 to \$44, depending on city in which employed.

### *Where To Go For Additional Information*

Information on salaries, hours of work, and supplementary benefits for office workers in 11 large cities are available from:

U. S. Department of Labor,  
Bureau of Labor Statistics,  
Washington 25, D. C.

Information, particularly on private business schools, may be obtained from:

National Council of Business Schools,  
839 17th St. NW.,  
Washington 6, D. C.

## Stock and Stores Clerks (Air Transportation)

(D.O.T. 1-38.99)

### *Outlook Summary*

Some openings each year. Competition for jobs usually considerable but likely to decrease during next few years. Long-run employment trend upward.

### *Nature of Work*

Most stock and stores clerks employed by the air lines are in the storerooms at the main overhaul bases and, to a less extent, at the smaller service stations where day-to-day line maintenance work is done. Duties include receiving and unpacking the tremendous number of different parts and supplies, issuing these to the mechanics and other personnel, packing and shipping materials and equipment, and keeping records and inventory controls. In the larger stockrooms, different groups of clerks may specialize in different phases of the work.

There are also a few stock clerks in the larger nonscheduled flying services and other fixed-base operations. The general nature of the work is very similar to that in air-line stockrooms, but since the operations are on a much smaller scale, there is likely to be little, if any specialization of work or distinction between grades of clerks. Often only one clerk is employed, and in many such instances he may be required to perform mechanical duties in order to keep himself fully occupied.

### *Qualifications and Advancement*

There are no legal requirements for work in this occupation, and the standards used in hiring junior clerks vary considerably from one carrier to another. Some air lines may or may not require even a high-school diploma; others prefer applicants with some college or business-school education. Ability to read and to write legibly is always essential. The minimum age limit is usually 18; the maximum may vary from 35 to 50.

On a few air lines, passing of a physical examination is necessary. Previous clerical experience, especially in aircraft or automotive stock and stores work, is always an asset, sometimes a prerequisite for the job. In general, positions above the level of junior clerk are filled by promotions from within the company.

### *Outlook*

Expansion in employment may be expected over the long run in this as in most other occupations in air transportation. Since the end of the war, however, the number of stock and stores clerks employed by the air lines and in related activities has not risen significantly; it was between 2,000 and 3,000 in round figures on VJ-day and is still within this range. There is little likelihood that more than double the present number will be on pay rolls at the end of the next 5 years, however vigorous general business activity may continue to be.

The pool of qualified job applicants from among persons with and without experience in the field is expected to be ample to meet hiring needs in the immediate future. Since entrance into the occupation is easy and the work fairly interesting and pleasant, competition for employment is usually strong. However, the 70-group air force program legislated in May 1948 is expected to mean expanding job opportunities in aircraft manufacturing and related activities and therefore decreasing competition for stock-clerk jobs in air transportation.

Most jobs will be found in the 55 city areas where the air lines' main overhaul bases are located. However, there will be some openings at large airports in other localities.

### *Working Conditions*

The usual work schedule with the air lines is a 40-hour week and an 8-hour day. Typical start-

ing rates of pay of nonsupervisory clerks range from 90 cents to as high as \$1.25 an hour. Advancement is possible to rates as high as \$1.45. A 2-week vacation with pay is usually given.

Stock clerks are widely organized for collective bargaining. They are represented by several different unions.

#### *Where To Get More Information*

Additional information on the occupation of stock and stores clerks is given in:

Employment Opportunities in Aviation Occupations, Part I—Postwar Employment Outlook; Part II—Duties, Qualifications, Earnings and Working Conditions. (Bulletins Nos. 837-1 and 837-2.) U. S. Bureau of Labor Statistics, 1945 and 1946. 36 pp. and 45 pp., illus. Price 10 cents

and 20 cents. Superintendent of Documents, Washington 25, D. C.

To find out about openings with air lines and the exact qualifications needed, inquiry should be made to the personnel managers of the lines. Addresses are listed in part II of the bulletin just mentioned or may be obtained from the Air Transport Association of America, 1107 Sixteenth Street NW., Washington, D. C.

Information as to locations of air fields, repair stations, and flying schools can be obtained from the Office of Aviation Information, Civil Aeronautics Administration, Washington 25, D. C. For information regarding Federal Government positions, address this agency or any regional office of the United States Civil Service Commission.

*See also* Automobile-Parts Salesmen, p. 155.

## Traffic Agents and Clerks (Air Transportation)

(D.O.T. 1-44.12, .27, and .32)

### *Outlook Summary*

Job opportunities for newcomers likely to be limited in the immediate future. Long-run employment trend slowly upward in occupational group as a whole; more rapidly in positions concerned with cargo traffic than in other types of work.

### *Nature of Work*

These workers are employed mainly in air-line traffic departments. They include ticket agents, passenger agents, reservation clerks, and, at a somewhat higher level of responsibility, traffic representatives. Still further up the ladder are city and district traffic and station managers.

Traffic staffs are located principally in downtown offices or at airports in or near large cities—the primary source of air-line customers. However, some are in smaller communities where air lines have scheduled stops. A few are stationed in foreign countries.

### *Qualifications*

There are strict hiring standards with respect to appearance, personality, and education—to qualify employees for the constant contact with

the public which is involved in most traffic jobs. High-school graduation is generally required; some college training is considered desirable. Experience in connection with freight or express traffic in other branches of transportation will be increasingly valuable. Aviation background and sales experience are helpful for higher-grade jobs. Women are commonly employed as reservation and ticket agents; some few are passenger agents. The occupations covered in this statement are among the best in the industry from the point of view of advancement.

### *Outlook*

Employment in traffic jobs is expected to increase both in the near future and over the long run. In early 1948, more than 10,000 people were employed in such jobs by the air lines. Five years hence, the number should be substantially greater, if general business activity continues high. The largest numbers of openings will probably be for ticket and reservation clerks. However, relative growth may well be most rapid in jobs connected with cargo traffic, which now employ far fewer people than are in the passenger end of the business. Increasing emphasis is being placed on cargo traf-

fic; it has barely been tapped by the air-transport industry. The United States Department of Commerce (Domestic Trade Digest, December 1947) says: "Air freight traffic may be expected to expand at a more rapid rate in 1948 than any other form of transportation, passenger or freight."

During 1947, cut-backs in domestic operations and improvements in the handling of traffic led to a good many lay-offs in air-line traffic departments. By now, however, probably all furloughed personnel who desired to do so have been able to return to their own jobs or to take other air-line positions for which they qualified. Job chances of newcomers should be perceptibly better before long, bolstered by the general upward trend in employment and other factors. The planned air-force expansion, however, will have a negligible effect.

#### *Earnings and Unionization*

Earnings vary widely, depending on the degree of responsibility of the job. A representative sal-

ary range for agents and clerks was \$150 to \$250 or more per month in early 1948. Station managers and district traffic managers in large cities sometimes made as high as \$400 or better a month.

Reservations and transportation agents are covered by a union contract on only one line, where they are represented by the Brotherhood of Railway and Steamship Clerks, AFL.

#### *Where To Get More Information*

Inquiries regarding job openings should be sent to the personnel managers of the air lines. Addresses are listed in:

Employment Opportunities in Aviation Occupations, Part 2—Duties, Qualifications, Earnings and Working Conditions. (Bulletin No. 837-2.) U. S. Bureau of Labor Statistics, 1947. 45 pp., illus. Price 20 cents. Superintendent of Documents, Washington 25, D. C.

They may also be obtained from Air Transport Association of America, 1107 16th St. NW., Washington, D. C.

## General-Insurance Agents and Brokers

(See D.O.T. 1-57.10)

#### *Outlook Summary*

Many opportunities each year for experienced men; some for women. Training courses available for inexperienced persons. Long-run trend in employment upward.

#### *Nature of Work*

Agents sell one or more kinds of general insurance (fire, casualty, marine, surety, and other) as representatives of underwriting companies or of brokerage firms. Brokers give service to individuals and firms seeking insurance and may have policies written on behalf of clients by any insurance company. Agents as well as brokers are considered independent contractors.

#### *How To Enter*

Little or no capital is needed to enter the field. Anyone who can meet the training and licensing requirements of the State or States where he wishes

to operate may become a broker. The tendency is for States to require licensing standards of competence, and about half give examinations. New York State gives written examinations covering insurance laws and other matters relating to the business. To become an agent, one must first obtain a contract with a company or a general agent of a company and then secure the necessary State license or licenses.

An expert knowledge of the chosen branch of insurance is necessary for the newcomer's success. Therefore, to prepare for work as an agent or broker, one should take courses in insurance and related subjects in a college, evening high school, or correspondence school, or with a trade association or insurance company. New agents sometimes have periods of on-the-job training when they are first hired and, in any event, usually work under close company supervision for a fairly long time. Since the broker is on his own once he starts in business, it is particularly important for men

planning to enter this type of work to get the best education and training.

### *Outlook*

There will be many opportunities for both experienced and inexperienced men in these fields during the next few years; also some openings for women. Of the quarter of a million or so agents and brokers in all branches of insurance, roughly one-third are in general insurance; almost all of the brokers are in this field. Employment is believed to be higher now than before the war. Additional workers continue to enter the field, however. The ease with which people can enter it encourages them to do so, and competition for business is always keen; large brokerage firms get most of the important accounts that are placed. Many people are forced out of the field, especially during the first year or two, because their earnings are so low. It generally takes 5 years or even longer for an agent or broker to establish himself.

The number of successful agents and brokers in business has so far had an upward trend and will probably continue to increase. The volume of surety and general insurance business is determined largely by population and property values; population is expected to go on growing until about the end of this century, and property values will probably continue to rise over the long run. While the number of agents and brokers does not change in direct proportion to changes in the amount of insurance business, it tends to move in the same direction, especially when business is increasing. Because of the expected growth in insurance activity and other factors, the chances of successful employment as an agent or broker are likely to improve in the long run.

Openings for agents will be found throughout the country. Brokerage opportunities, however, will be mainly in large cities, such as New York, Philadelphia, Chicago, San Francisco, Los Angeles, and Washington, D. C. The best place to start is generally in one's own community, where one has the widest contacts. Other things being equal, however, it is considered easier to build up a business in the West than in the East. Opportunities in many parts of the South have improved considerably during the last few years. Texas is a promising area. In general, places which have had recent increases in population and income are likely to offer more favorable opportunities than other localities, but there may be offsetting factors. California, for example, has had very great population and income growth, but it already has many more agents and brokers than ever before.

### *Where To Go for More Information*

General agents or managers of insurance company branch offices can supply information not only on employment opportunities in the particular locality but on their companies' methods of selecting, training, and compensating agents. Questions on how to prepare for general insurance work may be addressed to the National Association of Insurance Agents, 80 Maiden Lane, New York 7, N. Y., or to State or local associations of insurance agents. Information on training courses is available from NAIA educational division at the above address.

For information about securing a license, one may write to the Department of Insurance at any State capital.

*See also* Insurance underwriters, page 97; and Life-Insurance Agents, page 153.

## **Life-Insurance Agents**

(See D.O.T. 1-57.10)

### *Outlook Summary*

Several thousand opportunities each year for experienced and inexperienced men; some openings for women. Long-run trend in employment upward.

### *Nature of Work*

Most life-insurance agents specialize either in ordinary insurance (policies with face values of at least \$1,000 and premium payments made directly to the general agent or company home office); or

in industrial insurance (low-premium policies with small face values and premiums collected by the agent in person); or in group insurance (policies covering a group of people, usually the employees of a particular company).

The work is much more highly personalized than most other sales jobs. An insurance agent often becomes the family financial adviser, building up a relationship with clients like that of the family lawyer or doctor. He is primarily a representative of a single company, although he may occasionally place new policies with other companies. The ordinary agent is generally an independent contractor, the industrial agent an employee.

#### *How To Enter*

To become an agent, one must first obtain a contract with a company (usually through a general agent). A license must then be obtained from each State in which the agent is to operate. In some States, about all that has to be done is to apply for a license and pay a nominal fee; usually the company makes the application and pays the fee. In many States, however (New York, for example), written examinations are given covering life-insurance principles, State laws, and other matters relating to the business.

An expert knowledge of the field is necessary for success. Therefore, to prepare for work as an agent, one should take courses in insurance and related subjects in a college, evening high school, correspondence school, or with a trade association or insurance company. In any event, the agent goes through a period of on-the-job training when he starts out with a company and works under close supervision for a fairly long time. All else being equal, the greatest success comes to men who like people and find it easy to deal with them.

#### *Outlook*

There will be several thousand opportunities each year for both experienced and inexperienced men to enter this large occupation; also some openings for women. Of the quarter of a million or so agents and brokers in all branches of insurance, including suretyship and general insurance, roughly two-thirds are life agents. Of these, slightly more than half are industrial agents.

Employment is higher now than before the war. Additional workers continue to enter the field, however. General agents rarely turn down qualified applicants and few States are attempting to restrict the number of agents. The ease with which people can enter the field encourages them to do so, and competition for business is always keen. Many ordinary agents are forced out of business, especially during the first year or two, because of low earnings; it generally takes 5 years or even longer for an agent to establish himself firmly. However, many companies which write ordinary insurance now give new agents financial assistance during the apprenticeship period. All industrial agents receive a salary from the start.

The number of successful agents in business has so far had an upward trend and will probably continue to increase. The volume of life insurance business is determined largely by population and purchasing power; population is expected to go on increasing until about the end of this century, and national income will probably continue to rise over the long run. While the number of agents does not change in direct proportion to changes in the amount of insurance business, it tends to move in the same direction, especially when business is increasing. Because of the expected growth in insurance activity and other factors, the chances of successful employment as an agent are likely to improve in the long run.

Opportunities for life agents will be found throughout the country. They are now more widespread than opportunities for other types of insurance salesmen. The best place to start is generally in one's own community, where one has the widest contacts. Other things being equal, however, it is considered easier to build up a business in the West than in the East. Areas where population and income have risen in the last few years are also likely to offer more favorable opportunities than other localities. Opportunities in many parts of the South have improved considerably. Texas is a promising area. In general, places which have had recent increases in population and income are likely to offer more favorable opportunities than other localities, but there may be offsetting factors. California, for example, has had very great population and income growth, but it already has many more agents than ever before.



*Where To Go for More Information*

General agents or managers of life insurance company branch offices can supply information not only on employment opportunities in the particular locality but on their companies' methods of selecting, training, and compensating agents. Other questions, including how to prepare for life insurance work, may be addressed to the following organizations:

Institute of Life Insurance,  
60 W. 42d St.  
New York 17, N. Y.

Life Insurance Agency Management Association,  
115 Broad St.,  
Hartford 5, Conn.

For information about securing a license, one may write to the department of insurance at any State capital.

*See also:* Insurance underwriters, page 97, and General Insurance Agents and Brokers, page 152.

## Automobile-Parts Salesmen

(D.O.T. 1-75.22)

*Outlook Summary*

Good employment prospects for experienced workers in the next few years; also a considerable number of openings in entry occupations. Long-run trend of employment upward.

*Nature of Work*

There are tens of thousands of automobile-parts salesmen in the country, working mostly for automobile dealers, parts jobbers, and parts distributors. Occupation includes both counter and outside salesmen, the former being the larger group. For either type of job, knowledge of a great number of automotive parts, often for various makes of cars, is necessary. Salesmen must identify parts, using micrometers, calipers, and other measuring instruments when necessary. They fill orders, quote prices, and give other information, using catalogs as a source. Some jobs involve examining faulty parts to determine what has to be replaced. Outside salesmen also visit retailers to solicit sales.

*How To Enter*

Men usually enter this field as stock or receiving clerks. After 6 months to a year at this type of work, they advance to the job of junior counter-man. Altogether, about 3 years' experience is usually necessary to qualify as counter salesman. Several more years in the latter job are required for advancement to outside salesman.

*Outlook*

Employment is now increasing and will probably continue to do so during the next few years. Since the end of the war, many veterans and other former parts salesmen have returned to their jobs. The wartime shortage of salesmen has thus been somewhat relieved, but more workers are still needed. Sales of auto parts and accessories are setting new records; in 1946, sales were more than double those in 1941; in 1947, they were still higher. In the next few years, the number of new cars manufactured is not expected to be sufficient to meet the backlog of replacement demand, and the average age of cars on the road will continue to be high. This factor, plus the growing number of cars in use, will keep the demand for parts at a high level and will probably create some further employment opportunities for salesmen. In addition, there will be openings owing to deaths, retirements, and transfers to other fields of work. Experienced workers should therefore have no trouble finding jobs.

Newcomers will find a considerable number of opportunities as stock and receiving clerks, from which they may advance to jobs as counter salesmen; also some openings in the small but growing number of formal training programs. Veterans with related stock-clerk experience in the armed forces generally receive preference for entry jobs, and advancement may be quicker for them than for inexperienced persons. In some areas, particularly in small towns, experienced automotive parts

salesmen, with general business ability and sufficient capital, will find favorable opportunities to open their own parts stores.

Long-run trend of employment is upward. In addition, employment in this occupation is relatively little affected by declines in general business activity. Most people who find jobs may therefore look forward to continued employment over a long period of time.

Jobs are to be found in all parts of the country, in small towns as well as in large cities. The greatest number of jobs are in States with the highest number of motor vehicles—California, New York, Pennsylvania, Ohio, Illinois, Texas, Michigan, and New Jersey.

### *Earnings*

Counter men are usually paid on an hourly basis, while the majority of outside salesmen are on a combination salary and commission basis. In some large cities, typical weekly earnings of experienced counter salesmen working for others were roughly \$40 to \$55 in 1946, depending on such factors as the size of shop and its location. Yearly earnings of outside salesmen in these cities were generally in the neighborhood of \$4,000 to \$6,000.



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Auto parts salesman fills an order for a customer.

Since 1946, the earnings of both groups have tended to increase.

### *Where To Find Out More About This Occupation*

National Standard Parts Association,  
8 S. Michigan Ave.,  
Chicago 3, Ill

## Filling-Station Attendants, Managers, and Owners

(D.O.T. 0-72.12 and 7-60.500)

### *Outlook Summary*

Job and business prospects fairly good in early 1948. Once labor shortages are met, employment will probably show little further increase for at least a few years. Many openings each year owing to turn-over.

### *Nature of Work*

Attendants work in filling stations owned or controlled by oil companies and in independent stations. They have a variety of duties—supplying passenger cars, trucks, and busses with gasoline, oil, water, and air; changing oil and doing lubrication jobs; installing accessories; changing tires and repairing inner tubes. Since filling stations generally have many supplies for sale—for example, batteries, spark plugs, light bulbs, and

tires—selling these makes up an important part of the attendant's duties.

Short training programs are conducted by many oil companies for employed attendants, some of whom become managers, operators (who lease a station, usually from an oil company), or owners. Except in some very large stations, managers, operators, and owners perform many or all of the duties of attendants, in addition to buying supplies, supervising their employees, and handling other business duties. The most common method of going into business for one's self in this field is to lease a station from an oil company; previous experience as an attendant is highly desirable.

### *Outlook*

Employment in filling stations has been rising steadily since VJ-day. It dropped sharply dur-

ing the war, but in early 1948 it was higher than in 1940, when about 200,000 attendants and 180,000 managers, operators, and owners were employed. There has been a tremendous increase in filling-station business. More cars were on the road in early 1948 than before the war; this has not only raised gasoline sales but also sales of automobile accessories and the amount of repair work, greasing, and washing. In addition, gasoline consumption per car was greater than ever before. While business has soared, employment has increased at a much slower rate, and at the start of 1948 there were still a great many stations with insufficient help. Qualified men should therefore have little difficulty finding employment. Persons with previous experience will generally have the best chance of finding jobs.

Once the labor shortages are relieved, employment is likely to show little if any further increase in the near future. Gasoline consumption is not expected to rise appreciably above its present peak for some time to come and may even drop a little, since the shortage of refining and transportation equipment limits the supply. It will probably be several years before there is enough gasoline available throughout the country to fill the ever-growing demand for motor fuel.

People interested in purchasing or leasing gasoline stations found in early 1948 that only a limited number of stations were available; a great many veterans, as well as other people, have gone into this business since the war. Stations selling the most popular brands of gasoline are now, as always, the hardest to get. The amount of capital needed to buy or build a station has been increasing somewhat with the rise in prices. A minimum of \$2,000 to \$3,000 at that time was necessary in most cases, the exact amount depending on the size and location of the station. At least one large oil company requires its prospective distributors to have capital of \$3,000 or more.

Over the long run, total employment will tend to rise slowly, since a continued upward trend in motor-vehicle registrations and mileage is anticipated—assuming that general business activity continues at a high level. In addition, there will

be several thousand job openings for attendants each year, owing to the high turn-over rate which is characteristic of this occupation. Opportunities for going into business for one's self will probably continue to be fairly numerous, since there is also considerable turn-over in ownership of filling stations.

Jobs are to be found in all parts of the country, including small rural communities. Employment of attendants is greatest, however, in States with the largest number of motor vehicles—California, New York, Pennsylvania, Ohio, Illinois, Texas, Michigan, and New Jersey.

#### *Wages and Working Conditions*

Wages in early 1948 were almost double what they were before the war. The average attendant earned around \$45 or \$50 a week in many large cities, while the manager got around \$60. Hourly wage rates for attendants seldom went above \$1 an hour, the higher weekly earnings coming as a result of longer working hours; often men work more than 10 hours a day. If consumption of gasoline should be curtailed, there may be a tendency to shorten the workweek, thereby also reducing earnings. In addition to their wages, some attendants and managers get commissions on sales. Earnings of operators and owners depend upon the location and size of the station and the volume of business, and therefore vary a good deal.

#### *Where To Go for More Information*

People interested in going into business for themselves will find valuable information in:

Establishing and Operating a Service Station. Industrial (Small Business) Series No. 22. U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce (1945). Price 45 cents. Superintendent of Documents, Washington 25, D. C.

Information on job and business opportunities in a particular locality can be obtained from local distributors of the large oil companies.

## Barbers

(D.O.T. 2-32.01)

### *Outlook Summary*

Good job prospects for skilled barbers, especially during next year or two; fairly good prospects for learners.

### *Nature of Work*

Barbers give a variety of personal services such as haircuts, shampoos, scalp treatments; for their male patrons they may also give shaves and facial massages.

### *Training and Advancement*

The most frequent method of entering the occupation is by taking a trade course in a public vocational school or a 6- to 9-month course in a commercial barbers' college. Graduates of such courses must usually serve 18 months as apprentices (or learners) before qualifying as journeymen. Apprentices must meet minimum-age requirements (generally 16 or 18 years); must, as a rule, have a grade-school education or its equivalent; and must be able to pass health examinations. In all States except Virginia, both apprentices and master barbers must have licenses.

Experienced barbers can advance by going into shops where customers spend more money on such services as facial massages, shampoos, and scalp treatments, or by opening their own shops. In some shops which are not managed by the owner, there is opportunity for promotion to manager. The majority of barbers are self-employed.

### *Outlook*

The employment outlook is good in this occupation especially for the next year or two, that is, for 1948 and 1949. In 1940, there were about 200,000 employed male barbers, and probably more than 10,000 unemployed. During the war, many went into war industries and the armed forces and few men were trained. As some veterans and other former employees have returned to the occupation, employment has gone up again to some extent.

Both learners and skilled men are still in demand in most parts of the country. The shortages are less acute in some areas than others, however, and are slowly but steadily diminishing. Newcomers may have difficulty getting the needed school training, since many barber courses are now full and some even have waiting lists.

After the labor shortage has been made up, employment is likely to level off and openings will be fewer. But so long as general economic conditions continue to be good, thousands of new barbers will be needed each year to fill vacancies due to deaths, retirements, and transfers to other fields. Moreover, declines in general business activity do not reduce the number of men employed in this occupation as much as in many others—owing largely to the great number of self-employed barbers, who often manage to stay in business even if their earnings are much reduced.

Jobs are to be found in all parts of the country, in large cities and small. The greatest numbers are, however, in New York, Pennsylvania, Illinois, California, Texas, Ohio, and New Jersey.

### *Earnings and Working Conditions*

Most barbers are paid a fixed salary plus a commission, although some are paid either one or the other. Guaranteed weekly wages typically ranged from about \$25 to \$45 in many parts of the country in mid-1946, and have not changed very much since that time. Earnings from commissions have risen, however; this has meant an average increase of about 10 percent in total earnings, according to a rough estimate for early 1948. The earnings of individual workers vary, depending on such factors as type and location of shop and custom of the community regarding tips, as well as on skill and personality. They tend to increase as the barber establishes a personal following. The employee usually pays for his uniforms, razors, combs, and scissors.

Hours are long—at least 46 or 48 per week and many union contracts provide for a 51-hour week.

In a few shops, workers receive a 1-week paid vacation after a year of service.

The majority of organized barbers belong to Journeymen Barbers, Hairdressers, and Cosmetologists International Union of America, AFL; some to the Barbers and Beauty Culturists Union of America, CIO. Those who are shop owners or managers may belong to Associated Master Barbers and Beauticians of America.

#### *Where To Go for More Information*

The following organizations can provide addi-

tional information on such subjects as earnings, working conditions, training requirements, and job opportunities:

Barbers and Beauty Culturists Union of America,  
CIO,  
330 Flatbush Ave.,  
Brooklyn 17, N. Y.

Journeymen Barbers, Hairdressers, and Cosmetologists International Union of America, AFL,  
12th and Delaware Sts.,  
Indianapolis 7, Ind.

National Education Council,  
Associated Master Barbers and Beauticians of  
America,  
537 S. Dearborn St.,  
Chicago 5, Ill.

## Beauty Operators

(See D.O.T. 2-32.11-14, .21, .22, .31)

### *Outlook Summary*

Prospects fairly good for experienced workers, but inexperienced operators will find fewer and fewer openings. Long-run employment trend slowly upward.

### *Nature of Work*

The majority of workers are all-round operators who give a variety of services such as shampoos, hair cuts, hair setting, permanent waves, hair dyeing, face and scalp treatments, and manicures. There are, however, some less-skilled operators who can do manicuring only; also some with all-round training who specialize in other services. The few men in the occupation are mainly stylists specializing in hair cutting, setting, and permanent waving. Many operators are self-employed.

### *Training and Advancement*

In all States except Delaware, Mississippi, and Virginia, there are now licensing requirements. To qualify for licenses, operators must have reached a specified age (generally 16 or 18 years); they must pass health examinations; in most States they must have at least a grade-school (in some a high-school) education; and they must have completed satisfactory training courses. Usually, prospective operators take a 6- or 8-month course in a commercial beauty school or a trade course in a public vocational school. In the District of Columbia and the 45 States which require licensing,

there are about 1,130 schools offering beauty-culture courses approved by the State boards of examiners; there are schools in every State, in both small towns and large cities. Learning on the job is not common, although some States accept this kind of training in lieu of trade courses.

After completing a beauty course and obtaining a license, an operator ordinarily starts out in a small neighborhood shop, although especially skillful girls are sometimes able to go directly into higher-grade shops. A few women who are already licensed operators may work into positions with chain organizations by selling the firm's cosmetics in department stores and then taking advanced beauty courses at the company's training centers.

Experienced operators may advance by moving to a better shop or becoming specialists. A few, employed in large salons, may be promoted to positions as managers. Those who have skill, business ability, and some capital may be able to succeed in business for themselves.

### *Outlook*

Employment opportunities are expected to be fairly good for experienced beauty operators, less and less good for newcomers, in the next few years. During and immediately after the war, there was a labor shortage in this large occupation, which employed more than 200,000 women (including owners, managers, and specialists such as manicurists

and electrologists) and roughly 10,000 men in 1940. Both experienced and inexperienced operators could find plenty of jobs. The situation has been changing gradually, however, as former workers have returned to the occupation from war jobs and newly trained people have begun to enter the field in increasing numbers. Skilled workers can still find jobs fairly easily, especially in small towns. However, newcomers may expect more and more difficulty in finding openings and may have to accept relatively low pay or long working hours. Prospective students may also encounter obstacles in enrolling in courses, since some schools have waiting lists. Opportunities for men will probably continue to be limited in number and will most frequently be found in the larger shops in big cities.

The long-run employment trend will probably continue to be upward, assuming that general economic conditions remain good. However, the increase is likely to be slower than before the war. There will also be many openings owing to turnover.

Jobs are to be found in every State, in large cities and small. The greatest numbers are in New York, California, Illinois, Pennsylvania, Ohio, Texas, Michigan, and Massachusetts.

### *Earnings*

Earnings are influenced by length of experience, personality, and ability, as well as the type of shop and its location. They therefore vary widely. Median hourly earnings, excluding tips, of women operators in New York State early in 1947 were about 86 cents; men operators had a median of \$1.14 an hour. Manicurists earn less than all-round operators.

Many operators throughout the country are on a 48-hour week; a few are on a 40-hour week. However, a considerable number, especially in small shops, have extremely long hours. Some shops give 1 week's vacation with pay; a few give 2 weeks.

### *Where To Go for More Information*

The following organizations may be helpful in supplying information on such topics as job opportunities, training requirements, and working conditions:

Barbers and Beauty Culturists Union of America, CIO,  
330 Flatbush Ave.,  
Brooklyn 17, N. Y.

Journeyman Barbers, Hairdressers and Cosmetologists, International Union of America, AFL,  
12th and Delaware Sts.,  
Indianapolis 7, Ind.

National Council of Boards of Beauty Culture,  
17 N. State St.,  
Chicago 2, Ill.

National Education Council,  
Associated Master Barbers and Beauticians of America,  
537 S. Dearborn St.,  
Chicago 5, Ill.

National Hairdressers and Cosmetologists Association,  
212 5th Ave.,  
New York 10, N. Y.

To people interested in opening a beauty shop of their own, the following pamphlet will be of assistance.

Establishing and Operating a Beauty Shop. Industrial (Small Business) Series No. 25. U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, Superintendent of Documents, Washington 25, D. C. Price 30 cents.

## Hospital Attendants<sup>9 10</sup>

(D.O.T. 2-42)

### *Outlook Summary*

Good immediate employment opportunities. The need in the future will considerably exceed that of the prewar years.

### *Nature of Work*

They assist the nursing staff in hospitals by performing routine or less skilled tasks in the care of patients. Such services usually include bathing and dressing patients, answering call bells, making beds, serving food, assisting the patient

<sup>9</sup> See Statement on Practical Nurses.

<sup>10</sup> Prepared by the Women's Bureau, U. S. Department of Labor.

in walking, giving alcohol rubs, and possibly cleaning rooms and equipment. There is a trend toward standardizing their training and duties. Many are employed in hospitals for mental patients.

#### *Training and Other Qualifications*

Preparation for practice varies considerably. Many persons qualify for jobs as attendants through experience only and obtain jobs without being licensed. Veterans trained in such work in the Army or Navy will qualify for most jobs as attendants in hospitals. Two years of high school are preferred though not required for entrance to an approved course for training attendants. About half the States have made provision for licensing and requirements vary, but usually call for graduation from an approved course of 9 to 18 months, or the passing of an examination. In 1946 there were more than 96,000 attendants and practical nurses and almost 37,000 orderlies employed in approved hospitals. Of this number, over half were men. These men worked for the most part in veterans' hospitals or hospital departments in which all the patients were men, and particularly with male patients who were mentally ill.

#### *Outlook*

Employment outlook for the trained hospital attendant is good; however, it will become increasingly difficult for those without training to obtain desirable employment as the trend is toward licensing to protect both patients and qualified personnel. Schools trained very few attendants during the war, and poorly qualified persons often obtained jobs as attendants. Those trained in special courses such as were given by the Army and Navy should have no difficulty in obtaining employment either in veterans' or in other hospitals. The Federal civil service restricts positions as hospital attendants to veterans as long as such applicants are available.

There is a growing tendency toward the use of attendants to perform many of the functions

formerly performed by the professional nurse. As new treatments are developed, more assistants are required to aid the nurse or physician during the treatment and also with the preparation of the patient for it. Trained attendants or assistants usually are needed for this purpose as, for example, the hot packers who are used in the application of moist heat under the Kenny treatment for poliomyelitis. The war greatly increased the number of veterans who will require long-time hospitalization and the services of attendants. The increasing hospitalization of those suffering from mental or nervous conditions adds to the demand for trained attendants in mental institutions, as does the growing hospitalization of tuberculous and other patients with chronic illnesses. There is a growing trend toward merging the hospital attendant and practical nurse groups so that basic training and requirements for licensing will be similar.

#### *Earnings*

The basic annual beginning salary for hospital attendant jobs under civil service in 1947 was \$1,954. Recent Nation-wide information is not available on other hospital attendants. In one Midwest State, recommendation was made in 1947 to raise the base pay of attendants in State hospitals from \$75 a month to \$115 a month.

#### *Where To Go for More Information*

Additional information on the outlook for women as hospital attendants is given in the following publication:

Practical Nurses and Hospital Attendants. Bulletin 203, No. 5. United States Department of Labor, Women's Bureau, 1945. 20 pp. Price 10 cents. Superintendent of Documents, Washington 25, D. C.

Information may also be obtained from:

American Hospital Association,  
18 E. Division St.,  
Chicago, Ill.

## Practical Nurses <sup>11</sup>

(D.O.T. 2-38.20)

### *Outlook Summary*

Very good employment opportunities at present and in near future, particularly for those with training. It will become increasingly difficult for those without training to obtain the most desirable employment.

### *Nature of Work and Where Employed*

Practical nurses work in institutions, as visiting nurses with visiting nurse associations, and in homes. They work under the general direction of a licensed physician or the supervision of a registered professional nurse. They perform a combination of nursing and housekeeping duties.

### *Training and Other Qualifications*

Preparation for practice varies considerably. Two years of high school are preferred though not required for entrance to an approved course for training nurses. Courses are often available in public vocational schools, requiring no tuition fee. In the approximately 49 approved schools of practical nursing, located mostly on the east and west coasts, tuition ranges up to \$110. Hospital experience is required as part of the training. Maintenance may be provided by the hospital and a stipend for service is accepted practice.

Licensing of practical nurses is recommended by the American Nurses Association, but there is mandatory legislation of this kind at present only in New York (where it was suspended during the war and was not yet in effect in 1947), Arkansas, and Hawaii. Twenty-five additional States have made provision for licensing. Requirements vary but usually call for graduation from an approved school where courses are 9 to 18 months in length, and passing an examination covering such subjects as care of children and of the aged, care of

convalescents, care of medical and surgical patients, care of the mentally ill, dietetics and food preparation, hygiene, elementary anatomy, and nursing methods. A great many persons in this work obtain employment through experience only, but in States with licensure laws, those licensed are given preference.

### *Outlook*

In 1946 there were more than 96,000 practical nurses and attendants employed in approved hospitals in the United States in addition to almost 37,000 orderlies. At least an equivalent number of 133,000 are believed to be employed in private homes or by visiting nurse associations. More than half the hospital group are men whereas more than 95 percent of the noninstitutional group are women. The employment outlook for both groups is good. Because of a slowly growing insistence on licensing it will become increasingly difficult for those without training to obtain the most desirable employment. During the war, the needs of hospitals, public-health agencies, and industry, as well as an increased number of patients cared for at home, created a demand for practical nurses which was far greater than the supply. This demand is continuing because of the increasing use of hospital facilities brought on by Government programs, insurance, and preventive medicine.

The trained practical nurse performs many of the functions formerly performed by the professional nurse, such as the taking of temperatures and the giving of certain routine treatments. The earlier discharge of patients from hospitals after surgery or childbirth lengthens the convalescent period at home during which some nursing is required. Visiting nurse service and practical nursing at home will continue in high demand because of the increased number of chronically ill persons due to the larger proportion of older people in the population.

<sup>11</sup> Prepared by the Women's Bureau, U. S. Department of Labor.



*Earnings and Hours of Work*

Salaries vary greatly according to the place of employment, the hours worked, the amount of responsibility assumed and general economic conditions. During the depression period many practical nurses worked for wages amounting to little more than subsistence. On the other hand, during the war some practical nurses in communities where the shortage was critical earned as much or more than some professional nurses received. In 1943, salaries, according to one survey, ranged from \$4 to \$7 a day plus meals. In 1945, earnings varied from around \$10 a day in one city to \$25 a week in another. In some States, practical nurses and professional nurses have agreed that 75 percent of the usual professional nurse's salary is an acceptable salary for the practical nurse in any given area in the State.

Resident duty hours vary from 8 to 20 a day. In hospitals, 8 hours is often the rule, but there is wide variation of schedules and hours.

*Where To Go for More Information*

Additional information on the outlook for women as practical nurses is given in the following publication:

United States Department of Labor, Women's Bureau—Practical Nurses and Hospital Attendants. Bulletin 203, No. 5. United States Department of Labor, Women's Bureau, 1945. 20 pp. Price 10 cents. Superintendent of Documents, Washington 25, D. C.

Information may also be obtained from:

National Association for Practical Nurse Education,  
654 Madison Ave., Suite 407,  
New York 21, N. Y.

## Airplane Hostesses

(D.O.T. 2-25.37)

*Outlook Summary*

A good many openings for qualified applicants each year, but considerable competition for these jobs. Occupation will remain small for many years to come, despite rising employment.

*Duties*

Hostesses (also known as flight stewardesses) are carried on most air-line passenger flights within this country; also on some international flights. They are responsible for attending to passengers' needs and comfort while in flight—by serving meals, giving minor medical aid, helping to adjust seats, answering questions, supplying passengers with reading matter, and in other ways. They also have to keep some records. When a hostess and steward work together, as is often the case on big planes, the former tends to specialize in service to the women and children aboard.

Hostesses are stationed mainly in the few seaboard cities where international and transcontinental flights originate and inland at a number of air-line division points. A few are based in foreign countries.

*Qualifications and Advancement*

Entry into the occupation is usually as a "student" stewardess, for training by the employing air line. Frequently, however, girls trained in special private schools are hired through the placement facilities provided by such institutions for their own graduates. In either case, applicants must be in excellent physical condition; have a pleasing personality and appearance; be in their twenties or within even narrower age limits; and also be within specified height and weight limits. As a general rule, only single women (or widowed or divorced women without children) are eligible for jobs, and their continued employment is conditioned upon their remaining unmarried. Applicants who are registered nurses are strongly preferred, but not nearly enough are available to fill all openings; about 1 out of 10 of all present stewardesses are nurses. Girls without this qualification must, as a rule, have at least 1 or 2 years of college education. For international flying, knowledge of a foreign language is another requirement. Experience in handling food may be considered.

From the position of hostess, the line of promotion is to instructor and division chief hostess.

### *Outlook*

Employment in this occupation is now (early 1948) much higher than at the war's end, when the air lines had about 1,000 hostesses on their pay rolls. Since VJ-day, several thousand new hostesses have been hired. Some of these new recruits were needed to staff the many additional larger planes put into service. Others filled vacancies owing to turn-over, which is always heavy in this occupation, but has been greater than usual since the war—as a result of an exceptionally high marriage rate and the fact that other types of jobs have been relatively easy to obtain. During 1947, the air lines had to make some nonseasonal layoffs, but at the end of the year employment totaled over 3,500. By 1950, it may well be in the neighborhood of 5,000, assuming continued high levels of general business activity. The long-run employment trend, too, is almost certainly upward.

The high turn-over rate, combined with the steadily increasing need for stewardesses, make the job prospects in this field more favorable than in many other aviation occupations. The recent furloughs, largely temporary in character, will have only a slight effect on the job chances of newcomers even in the immediate future. Competition for jobs is likely to be keen, however. Despite the air lines' strict hiring standards, the interest in the occupation is so great that there are practically always qualified applicants competing for positions. In addition, some lines are as willing to hire stewards as they are to take on hostesses for many runs.

### *Earnings and Working Conditions*

Earnings on domestic lines range from \$170 to \$235 or more per month for most stewardesses. They are considerably higher on international lines, especially for registered nurses.

Working time averages well over 100 hours a month. Most of this time (as high as 85 hours a month) is spent in flight. Domestic lines generally give 2 weeks' vacation with pay each year; international lines, 1 month.

As a rule, airplane hostesses are on duty away from base about half the time. When they are



An air-line hostess serving lunch.

working away from home, their living expenses are paid by the employing air line; they may also be allowed \$1 or more a day while on land for incidental expenses.

Many hostesses belong to unions. Most of those organized are represented by either the Airline Stewards and Stewardesses Association (a branch of the Air Line Pilots Association, AFL), the Air Line Stewardesses Association (independent), or the Flight Purser and Stewardesses Association, AFL.

### *Where To Get More Information*

Detailed information on the occupation of hostess is given in—

U. S. Department of Labor, Bureau of Labor Statistics. Employment Opportunities in Aviation Occupations, Part I—Postwar Employment Outlook; Part 2—Duties, Qualifications, Earnings and Working Conditions. Bulletins No. 837-1 and 837-2. (1945 and 1946.) U. S. Government Printing Office, Washington 25, D. C. Price 10 cents and 20 cents.

Inquiries in regard to job openings should be sent to the personnel managers of the lines. Addresses are listed in part II of the bulletin just mentioned, or may be obtained from the Air

Transport Association of America, 1107 Sixteenth Street NW., Washington, D. C.

*See also* Registered Professional Nurses, page 49.

## Flight Stewards

(D.O.T. 2-25.32)

### *Outlook Summary*

A small but growing occupation in which vacancies occur frequently, owing largely to a high turn-over rate.

### *Duties*

Stewards are carried on most international air-line flights and an increasing proportion of scheduled domestic runs—especially on large planes making long-distance trips. Their work includes serving meals while aloft, attending to the comfort of the passengers in other ways, and keeping records. With increased use of larger planes, stewards will be more and more assigned ticket-collecting and related tasks usually identified with the job designation of purser. When a steward and hostess work together, as is often the case on large planes, the former tends to handle the heavier work; the latter, to specialize in service to the women and children aboard.

Stewards are stationed mainly in the few seaboard cities where international and transcontinental flights originate, but some are located inland at a limited number of air-line division points. A few are based in foreign countries.

### *Qualifications*

High-school education is a minimum requirement for this occupation; some college education is preferred. Knowledge of a foreign language is required for international flying. Excellent physical condition is a must, as are a pleasing personality and good appearance. In addition, applicants may not be above a specified height and weight. Also important is experience in handling food; many of the flight stewards now employed were formerly restaurant cooks or waiters.

### *Outlook*

Employment in this very small occupation is now (early 1948) considerably higher than at the war's end, when the two air lines then doing overseas flying on a commercial basis together employed only a hundred or so stewards, nearly all in this work at the time. Since VJ-day, a thousand or so new stewards have been hired, because of the rapid growth in international traffic, rising domestic traffic accompanied by increased use of stewards in home operations, and the high turn-over rate in the occupation. Despite some layoffs in the last half year or so, employment remains several times the end-of-war figure, although it is probably under 1,000. By 1951 or 1952, it may well double, assuming continued high levels of general business activity. The long-run trend, too, is almost certainly upward.

The high turn-over rate, combined with the steadily increasing need for stewards, makes the job prospects in this field more favorable than in many other aviation occupations. The recent furloughs, largely temporary in character, will have only a slight effect on the job chances of newcomers even in the immediate future. Competition for jobs is likely to be keen, however. Despite the air lines' strict hiring standards, the interest in the occupation is so great that there are practically always qualified applicants competing for positions. In addition, hiring policies are generally not so rigid nor stewardesses so hard to get, that difficulty in filling a steward opening may not be readily overcome by the hiring of a qualified woman instead. The general picture outlined above would be little affected by the planned air force expansion.

*Earnings and Working Conditions*

Earnings on domestic lines range from \$175 to \$240 or more per month for most stewards; they are considerably higher on international lines.

Working time averages well over 100 hours a month. Most of this time (as high as 85 hours a month) is spent in flight. Domestic lines generally give 2 weeks' vacation with pay each year; international lines, 1 month.

As a rule, flight stewards are on duty away from base about half the time. When they are working away from home, their living expenses are paid by the employing air line; they may also be allowed \$1 a day while on land, for incidental expenses.

Many stewards belong to unions. Most of those organized are represented by either the Airline Stewards and Stewardesses Association (a branch of the Air Line Pilots Association, AFL, or the Flight Pursers and Stewardesses Association, AFL.

*Where To Get More Information*

Additional information on the occupation of steward is given in—

U. S. Department of Labor. Bureau of Labor Statistics. Employment Opportunities in Aviation Occupations, Part I—Postwar Employment Outlook; Part 2—Duties, Qualifications, Earnings and Working Conditions. Bulletins Nos. 837-1 and 837-2. (1945 and 1946.) U. S. Government Printing Office, Washington 25, D. C. Price 10 cents and 20 cents.

Inquiries in regard to job openings should be sent to the personnel managers of the lines. Addresses are listed in part II of the bulletin just mentioned, or may be obtained from the Air Transport Association of America, 1107 Sixteenth Street, NW., Washington, D. C.

*See also:* Traffic Agents and Clerks (Air Transportation), page 151; and Railroad Clerks, page 342.

# Trades and Industrial Occupations

The trades and industrial occupations—skilled, semiskilled, and unskilled—are the largest of the broad groupings of fields of work. They offer employment to 4 out of 10 workers in the United States today. These workers are of prime importance to the economy because they are the men and women who produce the goods; they mine the coal and ore, run the railroads, build the houses, bake the bread, make the clothes, and keep our mechanical civilization in running order.

To the many young people whose interests and abilities lie in the mechanical or manual spheres, the trades and industrial occupations offer the bulk of employment opportunities. Within this area is offered a wide range of occupations varying in skill and earnings from the tool and die maker to the unskilled laborer.

While most of the jobs fall clearly into either the skilled, semiskilled or unskilled groups, distinctions cannot always be finely drawn. This is particularly true because the nature of the work in the occupations often changes as new machines or methods are introduced. Thus some of the types of work formerly done by allround craftsmen are now broken down into several different steps, each requiring a shorter period of training than was originally demanded of the craftsman. These are usually classified as semiskilled occupations, but in some cases the skilled designation has been kept. In the same way it is often difficult to distinguish between unskilled occupations and the simpler machine-tending jobs in the semiskilled group.

For practical purposes in guidance, informa-

tion on the outlook in each of the various unskilled and semiskilled occupations is not of major importance. For the most part a worker can move fairly easily from one to another, since training for most semiskilled occupations is given on the job in a few weeks or months at the most. To qualify for a skilled occupation, on the other hand, requires either a formal apprenticeship or a long period of experience and training in semiskilled jobs which gives the worker a chance to learn all the different phases of the craft.

The introduction of machinery and new, efficient processes over the last two centuries has slowly changed the relationship of the skilled, semiskilled, and unskilled occupations. In the old days the all-round craftsman, who made the entire product, and the unskilled laborer were the predominant occupations. As machinery came in and the process was broken down into a number of steps, each handled by a different worker, the semiskilled group gained in importance at the expense of both skilled and unskilled workers. In recent years the semiskilled have increased rapidly, the skilled have just about held their own, and the unskilled have declined. It has been easier to devise machines to do the lifting, carrying, digging, and other jobs in the province of the unskilled laborer than to find mechanical substitutes for the craftsmen.

The occupational reports in this section are grouped by industry or field of work, rather than by level of skill, since from the point of view of practical guidance that is the most useful grouping.

## SKILLED OCCUPATIONS

Skilled workers or craftsmen are a key group in our economy. They make the machines for our machine age, and the patterns, models, working samples, tools, dies, templates, or jigs without

which industrial processes could not be carried out by semiskilled or unskilled workers. They keep things running, too, since they are the repairmen, not only for equipment used in industry but also

for the large amount of mechanical equipment and appliances used by consumers—automobiles, household appliances, radios, and many other items.

These functions suggest why the skilled occupations have continued to grow, and why they offer good employment opportunities to a large number of young people. Moreover, because so many skilled workers are older men, a large number of jobs will open each year as men in the field die or retire.

The relative importance of the various skilled groups has been changing. While the artisan has in some cases been displaced by semiskilled workers, the repairmen occupations have been growing as the amount of mechanical equipment in use increases. Chart 30 shows that the occupations

which characteristically do repair work—the largest single one of which is automobile mechanic—are the second largest group of skilled workers, exceeded only by the building trades. Moreover a great many of the skilled workers in other fields do repair work as their major function; this is true, for example, of machinists, upholsterers, and plumbers, carpenters, and other building-trades workers.

The end of the decade of the thirties found the skilled occupations, many of which are employed in the construction and durable goods industries, severely hit by the depression. Fully 900,000 skilled workers—or 1 out of 7—were unemployed, and another 460,000 were employed in semiskilled, unskilled, and other occupations. In contrast to the situation in the professions, training of new



workers in many skilled trades had slowed down to a trickle. Moreover, immigration laws adopted in the twenties had cut off one of the major sources of the skilled labor supply. By 1940, half of the craftsmen employed were over 41 years of age, and relatively few young men were being trained in all-round skills.

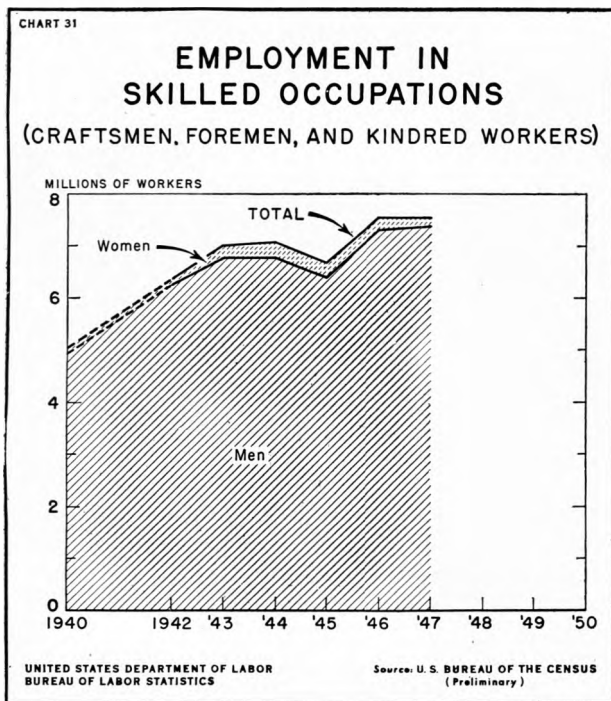
War production required great numbers of skilled workers. Employment of craftsmen, foremen and kindred workers increased by over 2 million in the early years of the war at the height of the factory and cantonment construction program, and then fell off somewhat, emphasis shifting to the metal trades as munitions production hit its peak (see chart 31). This rapid expansion of employment—at a time when many skilled

result, many of those employed in skilled occupations during the war did not have a fully rounded background in their craft. In some crafts such as tool and die maker and machinist, it was simply not possible to expand employment so rapidly and many men in these trades worked extraordinarily long hours during the war.

Recruitment of skilled workers for war industries was also facilitated by the movement of craftsmen from other industries. Employment of automobile mechanics dropped by about 150,000 during the war, many of them moving to factory jobs where their mechanical background could be utilized in skilled jobs. After the construction peak of 1942 many building craftsmen also moved into factory jobs.

In the postwar period, as construction activity increased, employment of skilled workers surpassed the wartime peak by half a million. Apprenticeship programs received great impetus as a result of the desire of veterans for thorough training leading to a skilled trade. From about 20,000 at the end of the war, the number of apprentices in programs registered with the Bureau of Apprenticeship of the United States Department of Labor shot up to more than 220,000 by the summer of 1948. More than half the apprentices in mid-1948 were in the building trades, and more than two-thirds of them were veterans.

In the long run the place of some craftsmen will be taken by semiskilled workers. But as mechanical equipment becomes more widely used—in industry, on farms, in the home—the need increases for the rapidly growing repairmen occupations. Furthermore, the small nucleus of all-round skilled craftsmen used in developing new equipment should increase in size somewhat as technology advances. In machine shops and printing—two of the major fields for skilled workers in manufacturing—moderate increases in employment seem likely in the long run. Railroad occupations and foundry occupations may not show any significant rise over present high levels. The model-making occupations in industry—tool and die makers, pattern makers, sample makers in apparel plants, etc.—will, in general, gain in employment only slightly, since a large increase in production and plant employment can usually be achieved with only a small expansion in this type of work. With



men were being called to the armed forces—is remarkable in view of the long period required to train craftsmen. It was made possible by recruitment from among the 1,360,000 skilled workers who were unemployed or engaged in other occupations in 1940, by temporary upgrading to craft or foreman jobs of semiskilled and other workers who already had partial training or qualifying experience, and to some slight extent by expansion of apprentice training in the metal trades beginning at the start of the lend-lease program. As a

greater use of semiskilled workers in industry, the number of skilled workers serving as foremen, leadmen, set-up men, lay-out men, inspectors, and similar workers should increase. Finally, with a great backlog of demand, construction employment may well remain high for several years, but is not likely to increase significantly above these levels in the long run.

The skilled trades offer certain advantages young men should consider seriously. With training and

experience in a craft, a man often has a wider choice of jobs; he may work in different cities or industries; he is able to handle not only the skilled job in the plant but also, if necessary, one requiring less skill, and he is therefore more valuable to his employer than the one-machine man. This pays off in job security, and usually in earnings as well. Moreover in many plants the skilled man, who understands the whole process, is given preference in promotion to a foreman's job.

### SEMISKILLED AND UNSKILLED WORKERS

More than one-fifth of the workers in the United States are "operatives," the census designation for what are often called semiskilled workers.

Like all broad occupational classifications this one has within it jobs varying widely in nature of the work, in earnings, and in levels of skill. For example, truck driving, one of the largest occupations in the group, calls for skill in driving, knowledge of routes and traffic rules, ability to make minor repairs, some clerical work, and independent responsibility and judgment. On the other hand some machine operator jobs in industry require only the repetition of a half-dozen different motions all day long—reach for a metal blank and put it in the machine, pull the lever, press the button, push the lever, take out the piece of metal, which now has been stamped or cut, and place it on a pile, reach for another metal blank. Such a routine can be picked up in a day and mastered in a few weeks.

With some exceptions, such as the truck driver's occupation, these jobs are generally fairly routine and repetitive. Often they pay fairly well, however, particularly when an incentive system based on the amount of production a worker achieves is in use. Frequently semiskilled workers in a large, efficient plant, or one that is represented by a strong union will earn more than skilled workers in inefficient or unorganized plants.

The semiskilled worker does not need to invest years of his life in learning his trade. This is a disadvantage in some ways, as was pointed out in the discussion of skilled workers—the worker with less training has less flexibility and is not so valuable to his employer. On the other hand, the semiskilled worker is not wedded to any one occupation because of long years he has spent in training

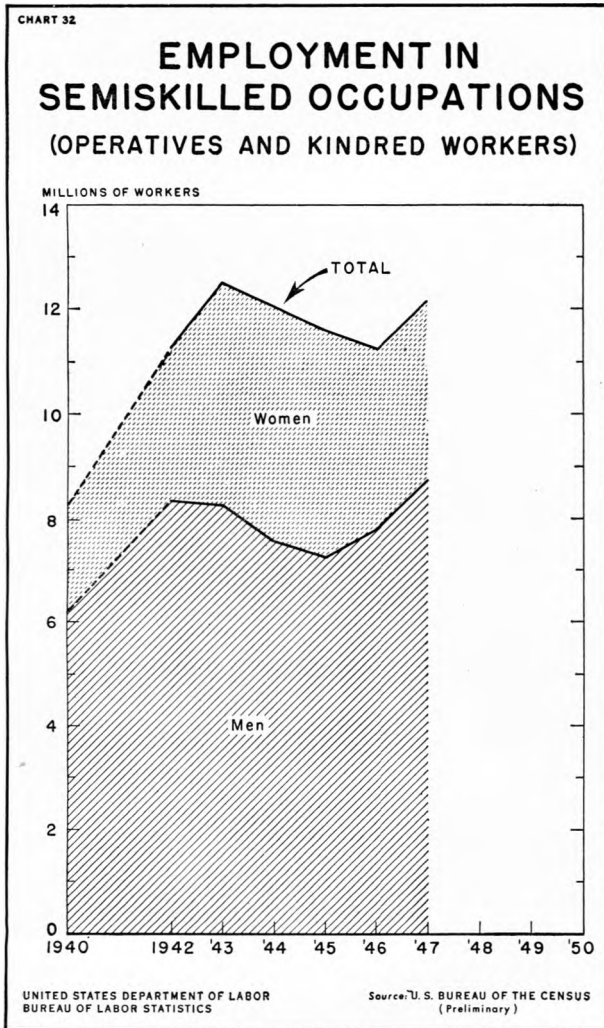
for it, and he is therefore more ready to adapt to new opportunities as they arise. Should the chances for employment disappear in one field of work, as often happens when some new process displaces an existing one, it is usually the semiskilled man who most readily writes off his investment of time and experience in that field, gets himself another job, and, in a brief period of training, learns the new occupation. Too often the craftsmen hang on in the outmoded occupation as long as they can, and longer than they should.

In the guidance and education of those who may become semiskilled workers it is important to stress flexibility. In a sense, many a semiskilled worker has a job or a series of jobs, rather than an occupation. His skill should consist not so much in doing one kind of work as in readily learning new kinds in response to his own need to find a new or better job or the needs of industry for an adaptable labor force. Rather than extensive training in a vocational school in one type of work, this person needs some familiarity with many different types—machine shop, woodworking shop, welding, electrical work, etc. He does not need to attain proficiency in any one of these fields, but does need an industrial literacy—a familiarity with the different types of processes and machines so that he can adapt readily to them.

The need for adaptability in the semiskilled worker is illustrated by the great increase in employment in this field in a short period in response to the needs of the war production program.

During the war, manufacturing employment increased and more new and heavily mechanized industrial plants were built. More semiskilled workers were needed, and over 4,000,000 were added—half as many as were employed in 1940





(see chart 32). Great numbers of hastily trained welders, riveters, machine tool operators, and assemblers, the largest part of whom were semiskilled, went to work in shipyards, aircraft factories, and munitions plants. The number of welders and machine tool operators nearly tripled from 1940 to 1943.

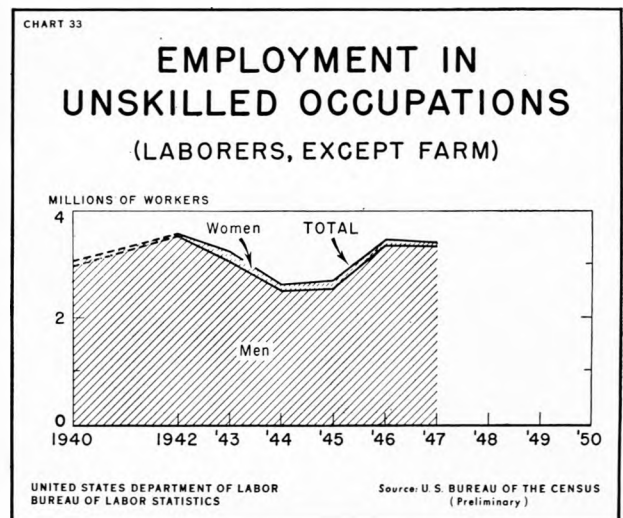
After a sharp drop when the war ended, employment in semiskilled jobs has again climbed nearly to peak wartime levels. Some workers had to learn new skills in the postwar period; more than 100,000 welders, for example, had to shift to other occupations. In many machine shops where some form of mass production had been introduced during the war, a return to prewar products and methods has meant need for fewer semiskilled men and more all-round machinists and skilled ma-

chine-tool operators. Nevertheless, employment in the semiskilled group, though not as high as at the peak of war industry employment, is far above prewar levels, and this group of occupations has increased its share of the working population.

In view of the long-term trends and the recent developments, it seems likely that these occupations will continue to grow, both in numbers and in relative importance. There are still large areas of work in which further mechanization holds the promise of additional employment opportunities for semiskilled workers. These include farming, the movement and handling of material in industry, and construction.

The increase in employment of semiskilled workers will mean relatively fewer jobs for unskilled workers. There are now over 3 million people engaged in unskilled jobs in industry. The long-term trend in this group has been downward relative to other occupation groups, and this trend continued during the war. Workers were drawn out of these jobs by the better pay in other occupations. Rapid strides in the use of machinery are displacing laborers from the principal work they are called upon to do in many industries: moving materials, loading, unloading, digging and shoveling, etc.

Employment in these occupations dropped during the war and increased after the war to above prewar levels partly because of the great amount of construction work being done (see chart 33). The long-term downward trend in relative importance will probably continue.



# Construction Trades

Construction work employs the largest group of skilled workers in all industry. In March 1940, over 1,600,000 persons were employed in the major construction trades; in addition a large number of workers were unemployed. As shown in chart 34, carpenters constituted the largest construction

trade, followed by painters, plumbers and steam fitters. Most construction workers are employed on new building, but a considerable number work on maintaining and repairing existing structures. It is easy to see, for example, that many more painters and paperhangers are needed



for repairing and redecorating than for new buildings, since most houses and apartments are redecorated every few years. Because they are engaged in maintenance work, many of the workers in the construction trades find jobs in other industries. Thus, in 1940 over 20 percent of the carpenters were employed outside the construction field in manufacturing, transportation, and Government.

While most construction workers are employed by building contractors, or by other firms for maintenance work, a large number are self-employed, working directly for property owners on small jobs. Most of these jobs involve maintenance and repair work, but minor alterations and additions and small new buildings such as garages are frequently undertaken by individual construction workers. These jobs last from an hour or so to a few weeks. Payment may be by the hour or day, or an agreed amount for the job, with materials provided by the owner, or it may be an over-all price including the cost of all materials. Self-employment is most common in painting, decorating and paperhanging, and in carpentry, but is also found in plastering (for repairs only), in masonry repairs, and (to the extent permitted by State and municipal licensing requirements) in plumbing repairs. It is impractical for all types of work requiring extensive shop facilities or field equipment.

There are many different types of new construction and each has a different set of employment needs for the various construction trades. Residential building uses many carpenters, but this trade is less important in industrial plant construction. The building of roads, airports, and dams may call for many men of certain trades and practically none of others. During 1947, residential building ranked first in amount of new construction, followed by industrial plants and public utilities. However, the relative importance of any type of construction varies from year to year.

Like activity in most other durable goods fields, construction work has had its ups and downs, rising sharply in good times, but falling off severely when business slumps occur. Declines in construction work in bad times may be partially offset by increased expenditures for public works in such periods. During the depression of the 1930's

construction activity would have been much lower than it was except for the public funds spent on various projects.

Construction workers have lay-offs more often than the workers in many other occupations. To a large extent this results from changes in the employment needs of individual contractors, since the workers are usually laid off as soon as their particular jobs are finished at a specific building project. Sometimes the worker can get another job at once, but at other times, especially in winter, it may take a while before a new job is found.

Construction employment is also affected by seasonal slumps resulting mainly from weather conditions which interfere with outside building work, especially in northern areas. During most years, a good share of the construction workers are unemployed for as much as several months out of the year, and even when employed, frequently have days off. Although workers in construction trades receive relatively high hourly pay, seasonal work and time lost between jobs reduce substantially their annual earnings.

As can be seen in chart 11, page 24, employment on contract construction declined considerably during the 1930's after averaging 1,500,000 in 1929, and did not regain the 1929 level until the defense boom of 1941. Even though residential construction had already been curtailed, the program of war construction for military installations and war-plant facilities carried the volume of construction in 1942 higher than any previous year, and contract construction employment showed a corresponding increase, reaching a high point of 2,577,000 and averaging 2,170,000 over the year. Following this peak year, construction activity steadily declined during the war.

Since the war, there has been a great upsurge in the volume of construction work, although the increases have not come up to some expectations, because of material shortages and other limitations. The amount spent on construction was at an all-time high in 1947, although the physical volume was below that of previous peak years. The number of workers employed averaged 1,921,000 and reached 2,107,000 in September, the peak month. Despite the retarding effects of higher construction costs, the strong demands for all types of construction should take construction work even higher in the next several years and hold

it at a high level for some time to come, unless there is a marked decline in general business conditions.

Over the long run, changes in design and technological changes should continue to affect the relative needs for the different construction trades. Developments in design, materials, tools, and equipment will also change the nature of work done by individual trades. During the past 75 years, occupations such as carpenters, bricklayers, and plasterers have declined in relative importance, although actual employment has increased along with increases in total construction activity. On the other hand, newer trades such as plumbers and electricians have grown rapidly since 1900, since most structures built before that time had little in the way of plumbing or electrical installations.

The individual statements on the various construction occupations describe the way that an occupation is usually carried on, but because of differences among localities in customary practices and in the terms of union agreements they may not present a completely accurate picture of the situation in any given city. On the whole, lines of distinction between the work of the various crafts are most sharp, and specialization within crafts is greatest in large cities and the nearby

suburbs, and least in rural localities. In a city or village of 2,500 in a farming community for example, glazing is done by painters, or sometimes by carpenters, rather than by glaziers, and the local bricklayers commonly do cement finishing and sometimes plastering as well. In such places, any uncommon job requiring skill which cannot be picked up while doing roughly related work (such as installation of an elevator, or building of a structural steel bridge) is necessarily performed by workmen brought in from a larger city.

Because of the development of new materials and of new uses for old materials, distinctions between the fields of individual trades are in some cases quite detailed and in a few cases have not yet been established to the full satisfaction of all parties. The sections on individual occupations which follow are intended to give a general picture of the field of each, but no more; these are not intended as, and are not suitable for use as, a detailed description or a recommendation of the range or jurisdiction of any trade. A careful effort has been made to avoid error, but since there are some geographical differences in the distinctions between trades, it is possible that usage in some localities may differ from that indicated by the examples of work done.

## Carpenters

(D.O.T. 5-25.110 to .830)

### *Outlook Summary*

Outlook excellent for at least the next several years and probably favorable thereafter.

### *Nature of Work*

Carpentry is the basic trade in almost all construction. Carpenters have the biggest share of work in residential building. They play an important part in all other buildings such as offices and factories and are used to some extent on many other kinds of construction (bridges, dams, sewers, etc.). Carpenters likewise do a wide variety of less obvious jobs such as building temporary structures, concrete forms, scaffolds and platforms, chutes for materials or rubbish, safety barricades, etc. Many carpenters are used for alteration, repair, and maintenance work, particularly on residential buildings.

Although a carpenter is customarily thought of as working with wood, he also uses many other materials nowadays. In recent years numerous materials have taken the place of wood in uses where their special nature (insulating quality, lighter weight, or lower cost, etc.) makes them preferable. So the carpenter today finds himself working with insulating board, gypsum board, linoleum, wallboard, plywood, and other such materials.

The kinds of work that fall under the heading of carpentry are so varied that although a journeyman carpenter may be able to do them all, most carpenters specialize in some particular branch of the trade. The most common are house carpenters who build the wooden structure for frame and combination masonry and frame buildings. Other specialists, called trimmers or finish carpenters, may do nothing but install millwork (doors, sash, casings, and moldings, cabinets, etc.), and apply finish hardware. In many localities, laying hardwood flooring is a recognized specialty. Still another specialization is the construction of wooden forms for concrete work.

Job specialization is most prevalent around larger towns and cities where big building projects are common. In smaller places, the carpenter is more likely to be an all-round craftsman. In fact, in rural areas, it is not unusual for carpenters to do all sorts of building work, including operations which in larger places are done by the other building trades.

A comparatively large number of carpenters do repair and jobbing work on existing structures, including minor additions and alterations. Such men must have a wide range of skills because of the variety of conditions encountered and the different types of work to be done. Much of this work is done by individual carpenters working directly for property owners.

### *Where Employed*

Most carpenters work in the construction industry. Others are employed—mostly as maintenance men—in other fields, such as shipbuilding, aircraft manufacturing, motion-picture production, mining, metal products manufacturing, and hotels.

Quite a few go into business for themselves, mainly for repairs and remodeling work. Such workers, commonly paid by the job rather than by the day, are much like small contractors. Some in fact, eventually expand their operations and hire other carpenters for new building construction. Others work on their own account only part of the year, hiring themselves out to contractors during the busy season.

### *Training and Qualifications*

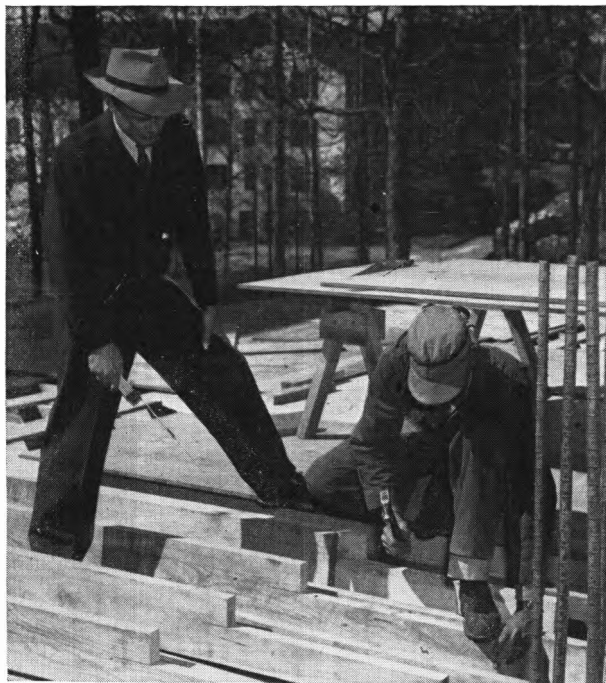
The trade of carpentry is made up of many elements. Among the things that a fully qualified man should know are skillful use of a wide variety of tools; the characteristics of materials, particularly the commoner woods; and an elementary understanding of structural design. He must also possess a thorough knowledge of construction

operations including the relationship between the work of the different trades, and a knowledge of simple mathematics sufficient for laying out of angled cuts for roof, dormers, and similar framing. Also required is the ability to read blueprints, make clear sketches of work to be done, and, when necessary, to work without drawings in making repairs or additions to existing work. Obviously there is much a carpenter must know, and while a person reasonably skillful with the basic tools can work efficiently on simple operations, a fully competent carpenter is a highly skilled man.

The customary way to become a journeyman carpenter is to serve a 4-year apprenticeship. An apprentice signs a contract with an employer covering his wages, training, and duties. However, it is the union rather than the employer which guarantees his training. The contractor is often unable to give an apprentice steady work. The union, on the other hand, can shift him to another contractor with whom it has an agreement so that his training and wages will not be interrupted. Most contracts provide for at least 144 hours of classroom work a year, covering such subjects as shop arithmetic, simple algebra, and woodworking shop practice. A few training programs enable an apprentice to earn a high-school diploma while he is completing his apprenticeship.

The usual on-the-job part of the apprentice's training includes learning to use all of the standard tools, and the measuring and lay-out devices such as the rule, square, steel square, level, and chalk line. His assignments progress in difficulty from rough simple jobs, such as laying subflooring or simple framing operations, to more complicated work such as making the frame for a complex roof. When his skill is sufficient, the learner advances to "trimming" (the installation of millwork and hardware and the laying of floors). At any stage he has a chance to observe the work of journeymen on more difficult operations, and to see how the individual pieces go together to make up framework of a structure. Emphasis in the training and, to some degree, the sequence in which various parts of the job are learned are of course affected by the types of work which the employer has on hand from time to time.

Although a 4-year apprenticeship is customarily required, many men learn the trade through the "pick-up" method and some eventually become journeymen. However, the union (most carpenters are union members) does not authorize the use of "helpers."



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR.

Carpenter apprentices learn the trade through actual work experience.

Veterans with carpentry experience in the service may be eligible for admission as advanced apprentices, or even as journeymen provided their experience has been sufficient to enable them to do satisfactory work and pass the examination customarily given by the local union at the completion of the apprenticeship period. Such provisions regarding "provers," as they are often called, vary according to the policy of the local union.

### *Outlook*

Opportunities for newcomers to learn the trade are excellent for the next several years, and will probably continue to be reasonably good for some years thereafter. The demand for residential construction has created a great need for carpenters,

who are especially important on this type of work. Other types of new construction which use carpenters are also expected to be at very high levels. In addition, there is a large accumulation of repair work and remodeling to be done. Now that supplies of lumber and other critical building materials show signs of becoming more plentiful, the demand both for skilled men and apprentices will be greater than at any time since the war.

The supply of skilled carpenters is still low in many localities. By the time construction activity reaches its expected peak, the need for additional carpenters (new workers) may be well over a hundred thousand. This does not mean, however, that there will be openings for additional workers in all localities throughout the country. In some areas the number of available carpenters is adequate for local expected needs; in others, even though more workers may eventually be needed, as many trainees as can be handled for the time being have already been apprenticed. Taking the country as a whole, however, additional apprentices are still needed in considerable numbers if construction is to reach its expected volume.

After the anticipated period of high activity, construction is likely to decline somewhat, reducing the need for carpenters, but normal drop-outs from the trade resulting from retirements, deaths (nearly half of the carpenters in 1940 were over 50 years old), and transfers to other kinds of work, will take up most of the slack. This will assure continued employment for those who are already established in the trade.

The demand for carpenters exists in all parts of the country. The greatest opportunities, how-

ever, are concentrated in large cities and in industrial areas, primarily in the Northeastern and North Central States.

### *Earnings*

Because they work in so many different localities, there is a wide variation in carpenters' wages. In April 1948, the minimum wage rate for union carpenters in construction averaged \$2.09 an hour in 75 cities throughout the country, but it ranged from as low as \$1.50 an hour to \$2.90 an hour, depending on where the carpenter worked. The minimum rates for some of the representative cities are shown below. (In this table and those that follow hourly rates are shown rounded to the nearest cent:)

Atlanta, Ga.....	\$1. 65	Milwaukee, Wis....	\$1. 80
Baltimore, Md.....	1. 95	Minneapolis, Minn..	1. 80
Birmingham, Ala...	1. 80	Nashville, Tenn.....	1. 60
Boston, Mass.....	2. 10	New Haven, Conn....	2. 10
Buffalo, N. Y.....	2. 00	New Orleans, La....	1. 70
Chicago, Ill.....	2. 15	New York City, N. Y..	2. 75
Cincinnati, Ohio....	1. 98	Omaha, Nebr.....	1. 95
Cleveland, Ohio....	2. 18	Philadelphia, Pa....	2. 00
Denver, Colo.....	1. 88	Pittsburgh, Pa.....	2. 25
Houston, Tex.....	2. 00	Portland, Oreg.....	1. 93
Indianapolis, Ind...	1. 98	Richmond, Va.....	1. 65
Jackson, Miss.....	1. 75	St. Louis, Mo.....	2. 20
Kansas City, Mo....	2. 05	San Francisco, Calif.	2. 00
Little Rock, Ark....	1. 63	Seattle, Wash.....	2. 07
Los Angeles, Calif...	1. 90	Springfield, Mass...	1. 88

Apprentices' rates are figured at a percentage of the journeyman's rate, and are increased periodically so that over the entire period of apprenticeship they average at least 50 percent of the journeyman's rate.

## Painters

(D.O.T. 5-27.010)

### *Outlook Summary*

Field is overcrowded and opportunities for new workers are limited. Competition will be especially keen in redecorating work.

### *Nature of Work*

The painter is a skilled craftsman who paints or repaints houses, apartments, and other buildings. Repainting or redecorating apartments and other

buildings which need periodic overhauling and maintenance make up most of his work. In the redecorating of interiors, the painting work is usually done by men who do both painting and paperhanging. (See statement on Paperhangers, p. 183.)

The painter sets up a scaffold of ladders, trestles, or planks; he then washes or scrapes and sandpapers the surface to be painted, using a blowtorch, scrapers, and other equipment. He mixes the paint from the basic ingredients, or re-mixes prepared paint, when necessary adding coloring to match a color sample or adding thinner. With a brush or spray-gun he applies one or more coats of the paint. He must have a knowledge of the drying speed, toughness, water resistance, and coloring of different paints, enamels, varnishes, and shellacs. If he runs his own business, he must obtain contracts, buy supplies, keep records, and figure costs.

#### *Where Employed*

About 80 percent of the painters described in this statement work in the construction industry. The remaining 20 percent are employed in maintenance work in such places as hotels and office buildings or they may work for manufacturers, and do maintenance painting of the plant and equipment.

#### *Training and Qualifications*

A man may learn to be a construction painter through a 3-year apprenticeship. In that case he signs an agreement with an employer concerning wages, training, and work, and receives a planned program of all-round training while on the job, including at least 144 hours of related instruction in class. Sometimes the painter learns his job by taking courses in a public trade school. Although many workers in the past have picked up the trade in a casual fashion while working as helpers, such a method may not give adequate training.

Under an apprenticeship program most of the training is done on the job. In large cities, outside courses are given in either union-sponsored or union-approved schools. In small cities and

towns, local trade schools or correspondence courses are frequently used to fulfill the apprentice's educational requirements. The usual order of the training on the job includes sandpapering; preparing and sizing walls; priming of woodwork; outside painting; removing old paint, and preparing surfaces to receive the first coat; matching, mixing, and harmonizing colors; paint formulas; scaffolding; and the care and use of brushes, scrapers, sanding machines, and other tools and equipment connected with the trade.

#### *Outlook*

The amount of painting to be done on new construction is expected to increase for the next several years. But the largest volume of painting required will be the redecorating and maintenance work on apartments, hotels, homes, and factories which have already been built. This work, during the next few years, will also be considerably greater than before the war.

Despite the prospect of such a large amount of work, the long run outlook for new workers, considering the country as a whole, is not favorable. Taking into account both the qualified journeymen and the many workers who entered the trade without thorough training there are a great many painters already in the trade. In the field of redecorative painting, a large proportion of the painters are self-employed and the scramble for work is very keen. In addition, it is possible that many of the less-skilled painters who were employed in shipyards and factories during the war will attempt to set themselves up in the redecorating trade, although most are not qualified for such work without additional training. This would further limit opportunities in an already overcrowded field. The few painters who have regular work with the hotels, manufacturing plants, railroads, Government departments, and similar organizations have the best chances for employment the year-round.

#### *Earnings*

Minimum wage rates specified in union contracts for journeymen painters in 75 cities throughout the country averaged \$2.02 in April 1948, ranging from as low as \$1.25 to \$2.30 an



hour in various localities. The rates in some of the representative cities are shown below:

Atlanta, Ga-----	\$1.75	Milwaukee, Wis----	\$1.80
Baltimore, Md-----	1.78	Minneapolis, Minn--	1.80
Birmingham, Ala---	2.00	Nashville, Tenn-----	1.63
Boston, Mass-----	2.00	New Haven, Conn----	2.00
Buffalo, N. Y-----	1.88	New Orleans, La-----	1.63
Chicago, Ill-----	2.15	New York City, N. Y--	2.30
Cincinnati, Ohio----	1.88	Omaha, Nebr-----	1.50
Cleveland, Ohio-----	2.13	Philadelphia, Pa----	1.90
Denver, Colo-----	1.75	Pittsburgh, Pa-----	2.00
Houston, Tex-----	1.88	Portland, Oreg-----	1.88
Indianapolis, Ind---	2.00	Richmond, Va-----	1.63
Jackson, Miss-----	1.50	St. Louis, Mo-----	2.07
Kansas City, Mo----	2.05	San Francisco, Calif--	2.00
Little Rock, Ark----	1.50	Seattle, Wash-----	2.07
Los Angeles, Calif---	1.85	Springfield, Mass---	1.88

These earnings represent work principally on new construction. In redecorative painting, where the extent of unionization is not so great,

hourly rates are usually somewhat lower. On many redecorating jobs the painter is self-employed and quotes a price for the entire job.

Annual earnings for painters are usually among the lowest in the building trades, since they reflect both the overcrowded conditions in the trade and the seasonal fluctuations in employment. Adverse weather conditions may interfere with painting on new construction, and redecorating work is usually concentrated in the spring and fall renting seasons.

#### *Where To Learn More About the Trade*

Additional information may be obtained from the Brotherhood of Painters, Decorators, and Paperhangers of America (AFL), Painters Building, LaFayette, Ind., or from the Painting and Decorating Contractors Association of America, 12 South Twelfth Street, Philadelphia 7, Pa.

## Bricklayers

(D.O.T. 5-24.010 to .140)

### *Outlook Summary*

Anticipated expansion in new construction and repairs makes the outlook very good for several years. Over the longer run openings will be limited mainly to replacement needs.

### *Nature of Work*

Bricklayers are skilled craftsmen whose main work is the construction of walls, partitions, fireplaces, chimneys, piers, and other parts of buildings from brick, structural tile, concrete and cinder block, and other masonry materials. They also build blast furnaces and coke ovens, do refractory work such as lining kilns and industrial furnaces, build manholes for sewers, and build manholes and clay conduit lines for underground utility cables.

Bricklaying is precise work. Masonry joints must be planned and laid out so that the courses or rows of brick will come out even with the story heights, the tops of windows, door heads, sills, etc. In addition there must be proper lengthwise allowances for various openings for doors and windows. The bricklayer first spreads a layer or

"bed" of soft mortar, then sets the brick (or part of a brick depending on the size of the space) and gently taps it into place so that it will be precisely straight and true. Next, he cuts, or scrapes off excess mortar and applies it to the exposed end or back of the brick. As each row of brick is laid the bricklayer uses a gage line (tightly stretched cord) to be sure that the top and front surfaces of the brick are in line. At intervals he checks the work for trueness with a mason's level.

### *Where Employed*

About 80 percent of all bricklayers work in the construction industry both in new building and repair work. The rest are employed in a wide variety of other industries which require construction or repair work from time to time. Industries using furnaces, kilns, etc., which have fire-brick linings require a considerable amount of work to maintain them. Coal mining, iron and steel, crude petroleum and natural gas production, public utilities, glass, furniture and lumber products, the chemical industries, and Government agencies all use bricklayers to some degree.

Although public construction programs tend to spread the demand for bricklayers throughout most States, the largest number are located in the northeastern and north central regions.

### *Qualifications and Training*

A good bricklayer needs a good eye for straight lines and proportions, and a knack for using his hands. He should be able to picture in his mind how the parts of a structure fit together. He needs the ability to understand general science and simple arithmetic, to make rough sketches and drawings, to read blueprints, and to make measurements. The bricklayer's trade requires physical endurance to spread mortar and lay bricks hour after hour.

Generally, a man learns bricklaying through a formal apprenticeship, and usually 3 to 4 years are required for him to qualify as a journeyman bricklayer. The apprenticeship contract he signs with an employer contains an agreement about wages, training, and work. But it is the union which guarantees his training because the individual contractor is often unable to give apprentices a full year's work. The union, on the other hand, can shift him to another contractor with whom it has an agreement so that his training and wages will not be interrupted.

In some areas the training program has been accelerated greatly by brief trade-school courses in the manipulation of tools and materials. The courses have been encouraged by the Structural Clay Products Institute and endorsed by some locals of the bricklayers' union as well as by the masonry contractors' associations. They are designed to give within a few weeks' time, sufficient skill so that the beginner will be useful from the very start of the on-the-job training. Such courses, in addition to their other advantages, may speed up the progress of the apprentice in his apprenticeship training.

The apprentice-training program adopted in some cities calls for a definite amount of classroom work—usually from 4 to 8 hours a week—in general vocational and related technical subjects. Such schools are run either by the union or by the local school board. The subjects taken in class include the history of the trade; the study of brick, terra cotta, and other building blocks; the tools

and equipment of the trade such as trowels, squares, and levels; the characteristics of different kinds of mortar; making various types of measurements; and making and reading working sketches. Sometimes the student practices mixing mortar, cutting brick, and building walls, or watches such demonstrations in class. In most towns and small cities where there is no classroom instruction an apprentice is dependent for the related technical knowledge on training obtained at the job, or through correspondence courses.

### *Outlook*

Although many men have entered training for the trade since the end of the war, opportunities will continue to be good for several years. The prospect is for a high level of construction employment for several years, unless a severe business depression interferes. Eventually, construction activity will fall off somewhat, just as it always has in the past when the demands for new housing, industrial plants, and public works have been met.

Despite the expected drop in the total number of jobs, those who enter the trade should have continued employment, because many of the experienced men in the trade are nearing the ages when vacancies because of death or retirement become numerous. The average age of the bricklayers in 1940 was much higher than for many other occupations. The vacancies caused by those leaving the trade will take up any slack resulting from a decline in the need for bricklayers.

Although currently there are many job openings for experienced bricklayers, it may be difficult at any particular time to find an opening as an apprentice in some areas. Only a limited number of persons can be given training at any one time, and in certain localities the industry may already have taken on all the apprentices it can handle for the time being.

### *Earnings*

Bricklayers' wages are among the highest in the building trades. Minimum wage rates for union bricklayers in 75 cities throughout the Nation averaged \$2.43 an hour in April 1948, but varied from \$1.75 to as much as \$3.15 in different localities. Bonus payments, now prevalent in many

localities, make hourly earnings much higher in many instances. The minimum rates for some of the representative cities are shown below.

Atlanta, Ga.....	\$2. 00	Milwaukee, Wis....	\$2. 20
Baltimore, Md.....	2. 50	Minneapolis, Minn..	2. 08
Birmingham, Ala....	2. 25	Nashville, Tenn.....	2. 25
Boston, Mass.....	2. 15	New Haven, Conn....	2. 40
Buffalo, N. Y.....	2. 25	New Orleans, La....	2. 05
Chicago, Ill.....	2. 20	New York City, N. Y..	2. 75
Cincinnati, Ohio....	2. 25	Omaha, Nebr.....	2. 25
Cleveland, Ohio.....	2. 38	Philadelphia, Pa....	2. 50
Denver, Colo.....	2. 50	Pittsburgh, Pa.....	2. 45
Houston, Tex.....	2. 50	Portland, Oreg.....	2. 50
Indianapolis, Ind....	2. 23	Richmond, Va.....	2. 25
Jackson, Miss.....	2. 00	St. Louis, Mo.....	2. 50
Kansas City, Mo....	2. 50	San Francisco, Calif.	2. 81
Little Rock, Ark....	2. 50	Seattle, Wash.....	2. 37
Los Angeles, Calif...	2. 38	Springfield, Mass....	2. 33

In the past bricklayers have experienced considerable unemployment during the winter months. Outdoor masonry work can be severely damaged by freezing weather or heavy rain before the mortar has set and when construction is carried on in the winter there are usually many days when no bricks can be laid. With the use of protective devices such as tarpaulins, contractors can carry on brick work in unfavorable weather,

although at some added expense. In recent years contractors have made increasing use of such equipment and have developed new methods. However bricklayers in northern areas are likely to continue to lose a substantial amount of working time during the winter months in most years and this will affect their total annual income.

Apprentices' wages usually start at 50 percent of the journeyman's rate and increase gradually during the apprenticeship, reaching 90 percent during the final 6 months.

#### *How To Get Additional Information*

If you want the address of a local union which sponsors apprentice training in your locality write the Bricklayers, Masons, and Plasterers International Union (AFL), 815 Fifteenth Street NW., Washington, D. C.

Additional information may be obtained by writing the Apprenticeship Committee of the Associated General Contractors, 1227 Munsey Building, Washington 4, D. C., and the Mason Training Promotion Department of the Structural Clay Products Institute, 1756 K Street NW., Washington 6, D. C.

## Electricians, Construction

(D.O.T. 4-97.010)

### *Outlook Summary*

There will be continued opportunities for additional construction electricians during the next several years. Over the longer run, opportunities will be limited mostly to replacement of those who leave the trade.

### *Nature of Work*

A construction electrician installs electric wiring and fixtures and hooks up equipment that is run or controlled by electricity such as electric ranges, the controls on heating systems, air conditioning equipment, industrial machinery, etc.

On a large job, he is given specifications concerning the materials to be used and drawings which indicate various circuits and the approximate location of panel boards, load centers, etc. On less complicated jobs, such as wiring a small house, the electrician may work from verbal instructions or a simple sketch, along with information on the type and grade of installation wanted.

Whether the job is large or small, the electrician must follow the electrical laws of the State, and, unless it is in a small community, the municipal electrical ordinances. For example, under most codes he installs metal boxes wherever there is to be an outlet or switch. If a conduit system is used,

the wiring is enclosed in metal pipes (or conduits) connecting the metal boxes. Frequently, instead of conduit systems, wires wrapped with a continuous strip of steel ("BX") or with a flameproof fabric are used, but the codes (laws and ordinances) specify that certain minimum requirements must be met both in the material and the way it is utilized. In such cases he must use his own judgment in placing the outlets and the wiring and in properly arranging them on the different circuits so that the loads will be evenly distributed. Then he installs the fixtures, switches, and various electrical controls.



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR.

A big part of the electrician's job is installing electrical wiring.

Remodeling work provides a considerable part of total employment, as does also the installation of additional business or factory equipment in existing buildings. Commercial remodeling usually means substantial changes in the electrical system, especially in store modernization. Residential remodeling and modernization also affect the electric wiring. The installation or shifting of electrical equipment in stores, restaur-

ants, factories, etc., means extension of existing circuits or installation of new circuits to provide the necessary current and avoid overloading the old circuits. Even the smallest portable items, such as drink mixers at soda fountains, require nearby outlets, and if these are not already in place, they must be provided.

Not included among the construction electricians are stage and motion picture electricians, electrical equipment repairmen, linemen, and men working on telephone equipment.

#### *Where Employed*

Construction electricians are principally employed along with the other building trades in the construction of residences, apartments, stores, office buildings, and industrial plants, and in remodeling work. Some, however, work for electric utility systems, city or Federal Government departments, or work in coal and metal mines, manufacturing plants, and large buildings, where they install, change, and maintain wiring systems and electrical equipment. There are also various types of specialists, such as those who restrict their work to the construction and installation of electric signs.

Employment is naturally greatest in densely populated areas, partly because of the large amount of commercial and industrial wiring. However, small cities, towns, and villages, and even rural areas, are offering more new opportunities than previously, and electric service is being extended to more farms.

#### *Training and Qualifications*

A 4-year apprenticeship or, in some cases, several years as electrician's helper, is necessary to learn the trade. Picking up the trade informally through employment as a helper was fairly common at one time, but is much less prevalent nowadays. The union does not recognize helpers; they are, however, still employed in some cases on nonunion jobs. In many localities an electrician is required to have a journeyman's license for which he must pass an examination showing a well-rounded knowledge of the job and of State and local regulations. Men who held ratings as electricians in the armed forces usually will not qualify as journeymen without further training, but

their past experience may afford an opportunity to enter the trade as advanced apprentices.

### Outlook

For the next several years the outlook is good. The expected high level of construction activity will create jobs for many more construction electricians than were employed before the war. Many apprentices have entered training since the war but more workers are still needed for the time when construction reaches its peak.

After construction reaches its postwar peak and continues at high levels for a number of years, the rate of activity is likely to decline somewhat and this would reduce the total need for electricians. However, most if not all of the slack will be absorbed because workers die or retire from the trade each year.

### Earnings

In April 1948, minimum wage rates specified in union contracts for journeymen electricians in 75 cities throughout the country averaged \$2.24 an hour. In some localities the rates were as low as \$1.50; in others they amounted to as much as \$2.50 per hour. The minimum wage rates in

some of the representative cities are shown below.

Atlanta, Ga-----	\$2.00	Milwaukee, Wis----	\$2.00
Baltimore, Md-----	2.25	Minneapolis, Minn---	2.06
Birmingham, Ala---	2.00	Nashville, Tenn-----	2.00
Boston, Mass-----	2.15	New Haven, Conn----	2.00
Buffalo, N. Y-----	2.15	New Orleans, La-----	2.00
Chicago, Ill-----	2.35	New York City, N. Y---	2.50
Cincinnati, Ohio----	2.13	Omaha, Nebr-----	2.10
Cleveland, Ohio-----	2.25	Philadelphia, Pa-----	2.38
Denver, Colo-----	2.05	Pittsburgh, Pa-----	2.38
Houston, Tex-----	2.00	Portland, Oreg-----	2.00
Indianapolis, Ind---	2.10	Richmond, Va-----	2.00
Jackson, Miss-----	2.00	St. Louis, Mo-----	2.25
Kansas City, Mo-----	2.15	San Francisco, Calif---	2.25
Little Rock, Ark----	1.88	Seattle, Wash-----	2.27
Los Angeles, Calif---	2.25	Springfield, Mass---	2.10

Apprentice wages, based on a graduated scale, are designed to average at least 50 percent of the journeymen's rate over the 4-year period.

### Where To Get Additional Information

Additional information on apprenticeship may be obtained from the International Brotherhood of Electrical Workers of America, 1200 Fifteenth Street NW., Washington, D. C., or from the National Electrical Contractors Association, Ring Building, 1200 Eighteenth Street NW., Washington, D. C.

## Paperhangers

(D.O.T. 5-28.100)

### Outlook Summary

Considerable amount of paperhanging to be done during the next 5 years. However, opportunities for new workers are limited by the great number of self-trained workers who, while they may be less skilled than journeyman paperhangers, still obtain much of the redecorating work.

### Nature of Work

Paperhangers do decorating of new buildings and redecorating in existing buildings. In redecorating work paperhanging is often combined with interior painting into a single job. In new buildings men usually do only paperhanging. (See statement on Painters, p. 177.)

The basic steps in hanging wallpaper are familiar to anyone who has watched a paperhanger brush paste onto the back of a strip of paper, fold and carry it to the wall, then aline the top edge of the strip and smooth the entire length into place with a dry brush. The less obvious parts of the work are bringing the edges together exactly and matching patterns. In some cases old wallpaper must be removed and repairs made to the wall before the paper is hung. Sometimes fabric is used instead of wallpaper.

### Training and Qualifications

It has been customary for a worker to serve a 3-year apprenticeship, or to get equivalent experience as a helper, before he can qualify as a journey-

man paperhanger. However, many workers, entering the trade with little previous training or experience, have set themselves up in business—the amount of capital required is small—or have found employment with smaller contractors with less rigid work standards. Recognizing such practices, some union locals have become lenient regarding the admission of workers with limited experience and often admit new workers subject to oral examination and approved workmanship on the job. Such policies, however, vary from one local to another.

Sometimes the paperhanger learns the mechanics of painting while he is in training as a paperhanger or he may pick it up later. Local unions frequently offer night classes where journeymen in one trade learn the applied techniques of the other. Knowledge of such things as color harmony and decorative theory are common to both trades.

### *Where Employed*

Paperhangers find work on new buildings—houses, apartment buildings, or hotels—and in the periodic redecoration of existing buildings. Since a house or apartment may be repapered or painted as often as 20 times or more during its lifetime, the amount of work in redecorating far exceeds that on new construction.

### *Outlook*

The high level of construction activity will create a substantial increase in the demand for paperhangers to work on new homes for the next several years. In addition, a large backlog of redecorating work, accumulated as a result of wartime shortages of labor and material, will mean a considerable increase over prewar requirements for maintenance and repair work.

But the outlook for new workers entering the trade is not good in spite of the fact that in some areas there are only a few fully qualified paperhangers. The field as a whole is already overcrowded with less-skilled workers who have set themselves up in the trade before they acquired the training and experience necessary to qualify as journeyman paperhangers. More of such workers are likely to enter the trade since there is no means, particularly in the countless small redecorating

jobs, to restrict entrance to fully qualified mechanics. As a result, competition is likely to be most keen in redecorating work.

In the long run, the increasing popularity of painted walls in place of wallpaper may mean less work for paperhangers and further encourage the combining of the trade with that of painting. Furthermore, it has become common for householders to apply so-called water emulsion paints over old wallpaper instead of having new paper put on.

### *Earnings*

In July 1947, minimum wage rates for union paperhangers in 75 cities throughout the country averaged \$1.92 an hour, ranging from as low as \$1.25 in one locality to \$2.15 in another. Minimum wage rates in some of the representative cities are shown below.

Atlanta, Ga.....	\$1.75	Minneapolis, Minn..	\$1.80
Baltimore, Md.....	1.78	Nashville, Tenn.....	1.50
Birmingham, Ala...	1.75	New Haven, Conn....	1.80
Buffalo, N. Y.....	1.88	New Orleans, La....	1.50
Chicago, Ill.....	2.15	Omaha, Nebr.....	1.50
Cincinnati, Ohio....	1.88	Philadelphia, Pa....	1.75
Cleveland, Ohio....	2.00	Pittsburgh, Pa.....	2.00
Denver, Colo.....	1.75	Portland, Oreg.....	1.90
Houston, Tex.....	1.75	Richmond, Va.....	1.50
Indianapolis, Ind...	1.88	St. Louis, Mo.....	1.80
Jackson, Miss.....	1.50	San Francisco, Calif.	2.00
Kansas City, Mo....	1.83	Seattle, Wash.....	1.94
Little Rock, Ark....	1.63	Springfield, Mass...	1.75
Los Angeles, Calif...	1.88		

In many localities most paperhangers, particularly those working on redecorating jobs, are not union members, and their wages would tend to be lower than the rates shown above. The earnings of those in business for themselves depend upon the prices they are able to obtain for redecorating jobs.

Paperhangers, like painters, usually do not have regular year-round employment. Although they do a large amount of redecorating, the peak demand for this work usually occurs during and following the spring and fall renting seasons rather than during the winter—the off season for new construction. Paperhangers have comparatively full employment now, but after the present backlog of redecorating jobs is completed it is unlikely that most of them will have year-round work.

*Where To Learn More About the Trade*

Additional information may be obtained from the Brotherhood of Painters, Decorators, and

Paperhangers of America (AFL), Painters Building, La Fayette, Ind., or from the Painting and Decorating Contractors Association of America, 12 South Twelfth Street, Philadelphia 7, Pa.

## Plumbers and Pipe Fitters

(D.O.T. 5-30.010 to .410)

*Outlook Summary*

Substantial number of openings for apprentices for at least the next several years. Replacement needs will continue to create opportunities thereafter.

*Nature of Work*

Journeyman in the plumbing and pipe-fitting industry install, alter, and repair the piping systems (including fixtures and similar parts) for household and other water use, and for heating, steam power, refrigeration, fire sprinklers, industrial processing, and numerous other purposes. This broad field has been divided among several trades, but about 2 years ago the international union representing all of them adopted the policy of combining the entire pipe field into a single trade. The carrying out of this policy in any particular locality is decided by vote of the members of the union's locals there, and in many places (including many large cities) the craft distinctions are observed by journeymen as fully now as in the past.

The plumbing field includes water supply and waste piping with the fixtures themselves and their "trimmings" for houses, for other buildings and elsewhere (outdoor drinking fountains, for example). It includes many items for special uses such as hospital plumbing fixtures, restaurant sinks, dishwashers, commercial and nonportable domestic washing machines, etc.; gas piping; the public water-supply lines under streets and elsewhere; and a variety of infrequent installations (swimming pools, ornamental fountains, etc.).

The general pipe-fitting field takes in hot water and steam heating systems (including vapor and vacuum systems), high-pressure steam plants for power generation and for steam used otherwise (as for heating of materials in manufacturing operations), sprinkler systems for fire protection, re-

frigeration systems for processing and storage of perishables and for air conditioning (but not the ventilating work connected with air conditioning), lines for compressed air and industrial gases, and piping for industrial processing. This last type of work is used most extensively in oil refineries, chemical plants, and food-processing plants, but occurs to some degree in many other industries.

This is a field where adeptness in the use of tools and in handling of materials, although necessary, is less important than thorough knowledge. A truly skilled workman must be familiar with a wide variety of materials and an extremely wide variety of fittings and specialties, including their particular uses, their limitations or disadvantages, and the proper methods of handling. He must know the operating principles for different kinds of systems and the operating relationships between the different parts. He must be able to lay out the system so that it fits the building where it is being installed, and able to avoid unnecessary damage to other work in any cutting that is needed. For plumbing, he must know the State laws and city ordinances so that his work will pass inspection.

For a major installation there are separate piping drawings showing where all the pipes are to be placed with sizes and the location of valves and other special items, thus giving a complete picture of the installation. At the other extreme there may be no more than a verbal statement of the fixtures wanted and their approximate locations. From such information plus measurement of the building, the journeyman or foreman decides where and how the pipes will go. Then the necessary pieces are cut to length and assembled with necessary fittings, valves, and other parts. At the end of this "roughing-in" stage there is usually an inspection for plumbing by the city or State in-

spector, including a test under water pressure. When carpentry, plastering, and the other trades are far enough advanced, the job is finished by installation of the plumbing fixtures with their "trimmings" (faucets, drains, traps, etc.) or the corresponding parts of the heating system (radiators, etc.).

Examples of changes in the work within recent years are the rapid adoption of copper pipe with brass fittings for plumbing, the very recent growth of radiant hot-water heating, and quite interestingly the use of copper pipe for some of the radiant heating installations. Many others could be cited. It is because such changes occur that an over-all knowledge of the field and an understanding of principles are particularly important.

#### *Where Employed*

Most journeymen work in the construction industry, primarily on buildings but on other construction as well. Others work for municipal water departments, other utilities, and in shipbuilding. Commercial and industrial establishments also employ plumbers and pipe fitters for maintenance work and alterations, and some companies use them when they carry on their own construction work. They are found in almost every locality; although they are most numerous in large cities, opportunities have been increasingly good in small places because of rising standards in village and farm sanitation.

There is at all times a considerable amount of alteration and improvement work, in addition to new construction. This includes home modernization, store and office modernization, alterations and installation of new equipment in industrial plants, and preparing business property for new occupants. Soda fountains, restaurants, even dental offices, use equipment which must be connected to water-supply pipes and waste lines. Since these are usually not at the locations where the equipment is to be placed, they must be extended.

Repairs and replacements are more important in plumbing than in many other types of work, and help greatly in providing a sufficient volume of business in small localities. They are the mainstay of many of the small plumbing establishments.

Opportunities for the heating and industrial piping part of the work are more limited geographically than opportunities for plumbing. Steam and hot-water heating systems are naturally uncommon in the warmer parts of the country, and in the north are used most in cities having many apartment buildings and nonresidential buildings. Industrial piping is greatest where the industrial operations include processing of fluids. Refrigeration and fire-sprinkler system work is done in industrial and commercial buildings of many different types.

#### *Qualifications and Training*

A person interested in becoming a journeyman should have an interest in and the ability to master elementary physical science, and be skillful at using his hands. He must learn to make clear working drawings, to read architectural and piping blueprints, and to take measurements for laying out his work. Average physical strength is needed, but no more than for several other trades. As in other building trades, at times it is necessary to work under inconvenient and uncomfortable conditions.

Generally, the trade is learned through a 5-year apprenticeship. The apprentice signs an agreement, commonly with a joint committee representing the union and the local employers, about training, related school instruction, and wages and hours. Under the usual program, all-round training is given on the job and an apprentice is likely to be transferred to several employers in order to get experience in different kinds of work.

At least 144 hours of classroom work are given a year, including mathematics applicable to pipe work; physics, with special attention to liquids and gases, the elements of hydraulics, and heat; mechanical drawing; and theory, which includes materials, sanitation and elements of bacteriology, and piping systems. Also covered in school courses are piping drawing, shop work, and acetylene and electric welding. A new training course covering the entire piping field has been prepared by the international union, and is scheduled for publication in the near future. In localities where apprenticeship is for the separate trades (plumbing, steam fitting, sprinkler fitting, refrigeration fitting) rather than for the entire plumbing and



pipe-fitting field, the classroom training for any of these is likely to omit the material dealing almost entirely with the other trades. It seems likely that in localities where the apprenticeship is for the entire pipe field, many of the apprentices on reaching journeymen status will prefer to specialize in a particular type of work whenever such jobs are available.

In some localities a journeyman's license is required for plumbing work, obtainable after satisfactory completion of apprenticeship. A master's license is very commonly required for those intending to engage in plumbing contracting.

### Outlook

Prospects for the next several years are excellent, and thereafter the outlook for those already in the trade will continue to be good. A larger than usual number of replacements will be needed during the next 5 to 10 years, to fill openings left by those who leave the trade because of death or retirement. A large part of the journeymen plumbers and pipe fitters are in the older age groups where drop-outs for these reasons are frequent. By the time construction activity reaches its expected postwar peak, many more plumbers and pipe fitters will be employed in new construction than were needed just before the war. There will also probably be a large volume of repairs and remodeling work to bring old installations up to present day standards. Many manufacturing and other industries normally employing plumbers and pipe fitters were shorthanded during the war and need more men.

In some localities at any particular time, all the new workers (apprentices) that the industry can handle have already been taken on. In such cases, applicants for apprenticeships must wait until openings again are available, even though at the same time skilled journeymen are in demand in the community.

### Earnings

Minimum wages for union plumbers in 75 different cities throughout the country averaged \$2.20 per hour in July 1947, and ranged from \$1.75 to \$2.85 depending on the locality. Steam fitters averaged \$2.11 an hour and the minimum rates in the various localities ranged from \$1.65 to \$2.34.

The rates for plumbers and steam fitters in some of the representative cities as of July 1, 1947, are shown in the following table.

	Plumbers	Steam fitters
Atlanta, Ga.....	\$2.00	\$2.00
Baltimore, Md.....	2.00	2.00
Birmingham, Ala.....	2.00	2.00
Boston, Mass.....	2.00	2.00
Buffalo, N. Y.....	2.15	2.15
Chicago, Ill.....	2.15	2.15
Cincinnati, Ohio.....	2.13	2.13
Cleveland, Ohio.....	2.13	2.13
Denver, Colo.....	2.05	2.05
Houston, Tex.....	2.13	2.00
Indianapolis, Ind.....	2.10	2.10
Jackson, Miss.....	1.75	1.75
Kansas City, Mo.....	2.13	2.13
Little Rock, Ark.....	1.88	1.88
Los Angeles, Calif.....	2.25	2.20
Milwaukee, Wis.....	2.00	2.00
Minneapolis, Minn.....	2.00	2.00
Nashville, Tenn.....	1.90	1.90
New Haven, Conn.....	1.90	1.90
New Orleans, La.....	2.05	2.05
New York City, N. Y.....	2.81	2.30
Omaha, Nebr.....	2.00	2.00
Philadelphia, Pa.....	2.25	2.25
Pittsburgh, Pa.....	2.25	2.15
Portland, Oreg.....	2.13	2.13
Richmond, Va.....	1.88	1.88
St. Louis, Mo.....	2.25	2.13
San Francisco, Calif.....	2.25	2.25
Seattle, Wash.....	2.34	2.34
Springfield, Mass.....	1.93	1.93

Apprentices' wages are increased periodically,

Repair work keeps many plumbers busy, even during the slack seasons for new construction.

PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR.



and over the apprenticeship period, average about half of the journeyman's rate.

Although plumbing work on construction is seasonal, considerable repair and maintenance work makes for more regular year-round employment than in most other building trades.

#### *Where To Find Out More About the Trade*

For information on where to apply for appren-

ticeship in a given locality, write to the United Association of Journeymen and Apprentices of the Plumbing and Pipe-Fitting Industry, Ring Building, Eighteenth and M Streets NW., Washington 6, D. C.; to the Heating, Piping and Air Conditioning Contractors National Association, 1250 Sixth Avenue, New York 20, N. Y., or to the National Association of Master Plumbers, 1105 K Street NW., Washington 5, D. C.

## Plasterers

(D.O.T. 5-29.100 and .200)

### *Outlook Summary*

Job opportunities for plasterers during the next few years are excellent and additional workers must be trained. Plastering will always be an important part of building construction, as far as can be seen at the present time, although there will probably be changes in the relative importance of the different kinds of work.

### *Nature of Work*

The principal work of the plasterer is the application of several coats of plaster to a suitable base, to produce wall and ceiling surfaces and stucco exterior wall surfaces. In some interior work he produces textured surfaces which get no further decorative treatment, and in more elaborate work he produces surfaces in imitation of stone, marble, or other materials. In some types of buildings he produces curved ceilings and in ornamental work obtains a great variety of architectural effects using cornices, pilasters, vaulted and groined ceilings, arches, and relief ornamentation.

This occupational statement includes the work of plasterers only, exclusive of modelers, model makers, casters, and sculptors (engaged mainly in the shop production of relief plaster pieces for building and other uses). While engaged in closely related work, these are distinct occupations.

Employment is primarily in the construction industry, and almost exclusively at the construction site. Most of this is in new construction, but plastering is usually needed in extensive alterations and has become particularly important as a means of obtaining architectural and lighting effects in commercial modernization. Repair jobs

in old buildings are restricted in both number and size by the inherent durability of plaster.

### *Training and Qualifications*

A 4-year apprenticeship, or its equivalent, is needed for qualification as a journeyman. During this period the apprentice is trained in a wide variety of skills, of which manipulation of the tools is only one part. He must learn the properties and appropriate handling of the different kinds of materials and the different mixtures; the characteristics of the various backing materials or bases to which the plaster is applied; and procedures for getting true vertical and horizontal surfaces. He must also acquire ability to lay out curved, arched, vaulted, and other ornamental work which (when elaborate) presents difficult geometrical problems. He must learn methods of forming cornices and mouldings in place; of installing shop-made ornamental pieces and fastening them securely; and of applying and forming wet plaster onto ornamental pieces to join them smoothly or to add small repetitive figures which cannot be put on conveniently at the shop. The apprentice should become familiar with the work of other trades, such as proper means for supporting overhead and suspended plastering.

Standard apprenticeship includes 144 hours of classroom instruction each year, with particular attention to drawing, blueprint reading, and mathematics applicable to lay-out work.

### *Outlook*

The large volume of construction, which will reach its peak during the next few years, is ex-

pected to require many more plasterers than the number employed just before the war. During recent decades the number of apprentices trained was comparatively small, but more than 7,000 have been registered by the Operative Plasterers' and Cement Finishers' International Association since the beginning of 1946.

The long-range outlook is affected by several conditions, some favorable and others not. Many attempts have been made to get less expensive surfacing materials for ordinary walls and ceilings, and some of the products available in sheet form have been used extensively. It is likely, however, that alleviation of the shortage of plasterers will cut down the use of these other materials to at least some degree.

Public taste and architectural usage have changed, so that ornamental plastering in large metropolitan buildings (banks, the lobbies and public rooms of major hotels, the lobbies of leading office buildings, etc.) is used much less extensively than prior to the depression. It was in such buildings, in churches, in downtown movie theaters, and in larger Government buildings, that ornamental plastering had its chief market. There is little doubt that such work will always be used to some degree in certain types of buildings, and it seems likely to be used extensively in a few types, particularly some churches. For non-residential buildings as a whole, however, the trend has been toward simpler lines.

While the demand for plastering has been reduced in these directions, it has been increased in others. Within the last 20 years acoustical treatment has had widespread adoption, and plastering is one of the means by which such treatment is obtained. During the same period extensive attention has been given to lighting, including the effect of ceiling design. This has been most pronounced for retail stores, restaurants, and similar establishments, but by no means confined to such places. The result here has been a marked trend toward curved ceilings, commonly with recesses for concealed lighting fixtures or with flush fixtures fitting into, rather than protruding from, the ceiling. This work obviously required many more man-hours than would an ordinary flat ceiling for a room of the same size. Curved surfaces as a form of architectural or decorative treatment, without

special consideration for lighting effects, have also come into increasing use.

The use of mechanical equipment in large buildings (especially ventilating equipment, with or without air conditioning) has increased, and seems likely to continue. This means a more difficult plastering job, and hence more man-hours, than would be required otherwise. There has also been increasing use of concrete structural floors in small nonresidential buildings where formerly ordinary construction would have been customary. This likewise means a more difficult plastering job on the ceilings than is the case with nonfireproof construction. This trend may be expected to continue, and there are already some signs that it is beginning to spread to other types of buildings.

Stucco finish on exterior walls has been used widely in certain parts of the country, and used to at least some degree almost everywhere. Greater use may be expected because of an increased range of finishes and colors that can be provided, suitable to almost any architectural style.

### *Earnings*

The average of the minimum rates specified in union contracts for plasterers in various localities throughout the country was \$2.36 per hour in April 1948. Rates ranged from as low as \$1.75 an hour in one locality to as high as \$3.15 an hour in another. The minimum rates for some of the representative cities are shown:

Atlanta, Ga-----	\$2.00	Milwaukee, Wis----	\$2.00
Baltimore, Md-----	2.25	Minneapolis, Minn--	2.25
Birmingham, Ala---	2.00	Nashville, Tenn-----	2.25
Boston, Mass-----	2.25	New Haven, Conn----	2.40
Buffalo, N. Y-----	2.15	New Orleans, La-----	1.88
Chicago, Ill-----	2.23	New York City, N. Y.	3.00
Cincinnati, Ohio---	2.13	Omaha, Nebr-----	2.25
Cleveland, Ohio-----	2.38	Philadelphia, Pa----	2.50
Denver, Colo-----	2.25	Pittsburgh, Pa-----	2.25
Houston, Tex-----	2.50	Portland, Ore-----	2.35
Indianapolis, Ind---	2.15	Richmond, Va-----	2.00
Jackson, Miss-----	2.00	St. Louis, Mo-----	2.25
Kansas City, Mo----	2.50	San Francisco, Calif.	2.25
Little Rock, Ark----	2.00	Seattle, Wash-----	2.37
Los Angeles, Calif---	2.25	Springfield, Mass---	2.33

Whereas hourly wage rates have been high, annual earnings prior to the war were comparatively low. In part this was caused by a workday usually shorter than was common for other trades (in some localities a 6-hour day in comparison with

an 8-hour day for most of the trades) and in part by seasonal unemployment. Plastering in a small building is a comparatively brief job, and such jobs tend to be seasonal because of concentrated rental and sales seasons for new apartments and houses. Work on nonresidential buildings is less seasonal, and when these are sufficiently large the plastering extends over several months. Almost three-fourths of the plasterers working in 1939 had at least 6 months of work, but only a third had work for 9 months or more during the year.

### *How To Get Additional Information*

To obtain the address of a local union which sponsors apprentice training in your locality, write the International Association of Operative Plasterers and Cement Finishers, Fidelity Building, Cleveland 14, Ohio.

Information on apprenticeship may also be obtained from the Contracting Plasterers International Association, 1327 Majestic Building, Detroit 26, Mich.

## Sheet-Metal Workers

(D.O.T. 4-80-010)

### *Outlook Summary*

Substantial number of openings for apprentices in next several years. Some replacement needs thereafter.

### *Nature of Work*

Sheet-metal workers are highly skilled craftsmen who make, install, and repair equipment and units fashioned from lightweight metal sheets. Most of the work is for new buildings. This trade should not be confused with the jobs performed by certain types of semiskilled factory workers who produce a wide variety of articles from sheets or strips of metal, usually by stamping or die-forming. Most sheet-metal work is making and installing ducts to be used with ventilating equipment, and more especially with heating and air-conditioning apparatus.

While a considerable number of homes use hot air heating systems which require a system of air ducts, and some houses are equipped for air-cooling, the great bulk of the work with sheet-metal air ducts is in stores, offices, and other public places and in some industries where ventilating or air-conditioning equipment is essential to the manufacturing process.

Sheet-metal workers also lay roofing—when metal roofing materials are used—and install gutters and downspouts for rainwater. Metal strips (called flashings) are installed by sheet-metal workers around chimneys and at certain other places, such as those where some part of the build-

ing extends above the roof line. Such installations, while they are not a major part of what the sheet-metal worker does on new construction, need periodic repairs and replacements because they are exposed to the weather. Some sheet-metal workers specialize in roofing and related work (just as others may specialize in ventilating and heating).

Air-conditioning is doubtless the most important current development in the sheet-metal trade, but

Most sheet-metal work consists of making ducts for heating and air-conditioning systems.

PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR



other products, either introduced or more widely used in recent years, have also increased employment. For example, factory-made doors, window sash, frames, partitions, etc., made with sheet metal are being increasingly used in homes and also in public buildings and factories. Sheet-metal workers frequently install such products. Another example is the more specialized sheet-metal work on commercial signs, marquees, and the like for theaters, stores, and restaurants.

In many cases the sheet-metal products (air ducts and other units) are made right on the job where they are to be installed. In other cases they are made to order at the contractor's shop from drawings and measurements taken back on the job site. Large contractors commonly have separate shop crews and field crews. In any case, however, the shop work is a basic part of the trade. The reason sheet-metal work (especially heating and ventilating) calls for so much custom work rather than factory-made units is that nearly every installation requires special lay-outs, and different dimensions for the particular job.

#### *Where Employed*

The majority of the sheet-metal workers are employed in making and installing equipment on new buildings, or new installations in existing buildings. A very small number specialize in repair work. Apart from this work on buildings, sheet-metal workers employed in small shops, manufacture (and install), often to special order, a variety of kitchen equipment such as steam tables, dish racks, canopies, sinks, steel or copper kettles, and similar products for hotels and restaurants. Another specialization is the coppersmith work in constructing vats and stills for breweries and distilleries and hand-made fittings for marine work. But the number so employed is quite small.

Sheet-metal workers are also employed in a fairly wide range of manufacturing industries though there are only a comparatively small number in each. Probably the largest number are employed in the machinery industries, particularly those making blowers, exhausts, electrical generating and distributing equipment, food products machinery, and steam engines and turbines. Here they make and assemble sheet-metal parts on an individual order basis—enclosures and parts for special machinery, industrial ovens, and a great

many other items. This work requires the same skills, tools and equipment as does sheet-metal work for buildings, and is totally different from repetitive operations found in many factories, where one worker stamps out thousands of identical parts. During the war, the aircraft and ship-building industries employed large numbers of sheet-metal workers. Many of them were highly specialized and their skills did not, as a rule, compare to the all-round sheet-metal worker.

#### *Training and Qualifications*

An apprenticeship of 4 or sometimes 5 years is required, including a minimum of 144 hours per year of classroom instruction in pattern drafting, mathematics, blueprint reading, estimating, basic principles of heating and ventilating, and related subjects. Workers with several years' experience as helpers sometimes become journeymen, or their equivalent, without serving a formal apprenticeship.

Apprentices must be at least 16 years of age and have an eighth-grade education. However, completion of high school or trade school is strongly recommended. Good health, average strength, and agility in working on ladders and scaffolding are necessary, together with a high degree of manual dexterity, and a strong aptitude for mechanical work.

While it is necessary to acquire skill in the use of tools and to become adept at working from difficult positions, these qualities alone are not enough to make a person a thoroughly capable workman. This is a trade where rounded knowledge of the work being done and good elementary knowledge of the principles being followed are particularly important.

#### *Outlook*

Prospects for sheet-metal workers are excellent during the next several years. By the time the expected peak of building activity is reached, there should be jobs both on the construction site and in the shops for many more sheet-metal workers than were employed at the end of the war. In addition, a number of skilled all-round sheet-metal workers will be needed in the other industries mentioned above. For a number of years, both before and during the war, there were not enough apprentices in training. As a result the present sup-

ply of skilled workers is considerably below the expected demands and many new workers must be trained if these demands are to be met.

During the past several years the volume of sheet-metal work has been limited by inadequate supplies of metal sheets. As a result, in some areas the number of jobs has not been up to expectations. Such localities will not be able to use newcomers until the sheet-metal situation eases.

The long-range outlook is for a continued high level of employment, principally because of the increased use of sheet-metal work in construction. The rapid growth of air-conditioning is the major development creating a demand for sheet-metal work. The use of ventilating systems in factories is also expected to expand considerably.

### *Earnings*

Minimum hourly wage rates specified in union contracts for journeymen working on construction in 75 principal cities throughout the country averaged \$1.99 per hour in July 1947, but they ranged from as low as \$1.37 in one locality to \$2.50 in another. Wage rates in some of the representative cities are shown in the following statement.

Atlanta, Ga.....	\$1. 65	Minneapolis, Minn ..	\$1. 90
Baltimore, Md.....	2. 00	Nashville, Tenn.....	1. 60
Birmingham, Ala---	1. 73	New Haven, Conn....	2. 00
Boston, Mass.....	1. 90	New Orleans, La....	1. 60
Buffalo, N. Y.....	2. 00	New York City, N. Y.	2. 30
Chicago, Ill.....	2. 15	Omaha, Nebr.....	1. 75
Cincinnati, Ohio....	1. 90	Philadelphia, Pa....	2. 25
Cleveland, Ohio....	2. 00	Pittsburgh, Pa....	1. 88
Denver, Colo.....	1. 88	Portland, Oreg.....	1. 83
Houston, Tex.....	2. 13	Richmond, Va.....	1. 63
Indianapolis, Ind---	1. 88	St. Louis, Mo.....	2. 13
Jackson, Miss.....	1. 60	San Francisco, Calif.	2. 00
Kansas City, Mo....	2. 03	Seattle, Wash.....	2. 09
Los Angeles, Calif..	1. 94	Springfield, Mass---	1. 93
Milwaukee, Wis ---	1. 85		

The hourly rates are not among the highest in the building trades, but annual earnings are good because sheet-metal workers are more steadily employed than most other construction workers. Maintenance and repair work helps to take up the slack during the new construction off-season.

Apprentices average at least half the journeyman's rate throughout the apprenticeship period.

In other industries where sheet-metal workers are employed, hourly earnings are somewhat lower than in construction. Outside the construction industry, however, the work is usually not subject to much seasonal fluctuation.

## Structural and Ornamental Metal Workers

(D.O.T. 4-84.010, .020, .040, and .060)

### *Outlook Summary*

Opportunities are good for at least the next several years for those who want to enter as apprentices.

### *Nature of Work*

Structural-steel workers erect the steel framework for buildings. Best known are the tall buildings common in downtown locations, but structural-steel columns and roof framing are used frequently in one-story factory buildings, and to some extent in other types of buildings. Factories may also require steelwork for crane runways and to support heavy equipment. The men in this trade also put up steel bridges and towers, and install or erect certain types of tanks. In some cases they set structural-steel members in place when they occur in buildings not of steel frame

design, such as beams over wide doors and windows in masonry walls to support the brickwork above. Structural-metal workers erect steel scaffolding and sidewalk canopies for use by other construction trades and for protection of the public, both for new buildings and repair work. The steel scaffolding for exterior repairs to a tall building can be a fairly large job in itself. Other work includes the placing of vault doors with their frames, and installing the steel plate work covering the exterior of burglar-resistive vaults.

In erecting a steel framework or structure they first take the steel shapes already fabricated by other workers and hoist them into place in the proper order. They then connect them temporarily with bolts, accurately align the structure as necessary, and rivet or weld the parts together.

Ornamental iron workers typically handle light-

er materials, such as those not making up the basic framework of a building. The name "ornamental iron" is historical, and is likely to be misleading. Within recent years a large part of the work, probably more than half, has dealt with other metals than iron and steel—mainly aluminum alloys, brass, and bronze. In some cases the installations are highly decorative, although along much simpler lines than 20 or 30 years ago, while other installations are strictly utilitarian.

Ornamental iron workers install all metal parts used in buildings, excluding structural work, reinforcing rods, sheet-metal work and, of course, the metal used in plumbing and pipe fitting and in electrical work. They install metal stairways (which are much commoner than they seem, because the treads and platforms are commonly filled with concrete) and the railings and handrails at stairways, balconies, and elsewhere. They put in place solid metal sash and doors and their frames, including the common steel sash used in many kinds of buildings; swinging and revolving metal doors with their frames, and vestibules at the street entrances to office buildings, hotels, etc. Other work done includes doors, grilles, and screens, such as used at bank tellers' compartments and elsewhere; gratings, metal cabinets of many types, such as display cases and safety deposit

boxes; window and door guards, and a very wide variety of other installations.

### *Where They Work*

Structural and ornamental iron workers are engaged largely on new construction. They are also employed on alteration work such as insertion of a mezzanine floor in steel-frame buildings, installation of steel stairs during modernization of an old apartment or commercial building, or the addition of window guards to an existing building for burglary protection. There is even a little repair work, despite the durability of the materials—replacement of members weakened by long neglect of painting, replacement of bridge parts damaged by bad traffic accidents, etc.

The structural workers do no fabrication of their materials, beyond reaming out of mis-punched rivet holes and other small corrections of shop errors. In general the ornamental workers likewise do no fabrication, although some of the smallest contractors (especially in small communities) do not distinguish sharply between shop crews and field crews. Occasionally larger contractors use some of their erecting crews for shop work to handle peak loads, but this practice is not prevalent because of the substantially higher wage scale for the erecting men.

Ornamental iron workers are commonly employed within commuting distance of home because establishments capable of doing a wide variety of work can be maintained on a fairly low volume of business and hence are found in many localities. Ornamental metal for an occasional elaborate building in a small city is likely to be provided by a contractor from a larger city, who ordinarily either sends his own crew or sends a partial crew and hires other workers locally. On the whole, more traveling is involved for structural iron workers, because most localities have insufficient structural business to support an erection contractor or local crew.

Consequently, workers must be brought in from outside to handle the occasional structural work that occurs, such as a steel-frame office or factory building. Workers living in the largest metropolitan centers and preferring employment there are likely at times to find that the only vacancies are for out-of-town jobs.

Structural-metal workers must often work in high places.

PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR



*Training and Qualifications*

Ornamental-metal work is a highly skilled craft usually requiring 4 years of apprentice training. In structural-steel work—which calls for less skill—a 2-year apprenticeship is all that is customarily required. Men with several years of experience as helpers sometimes become journeymen, but, as the trade is highly unionized, few enter without serving a formal apprenticeship.

*Outlook*

Employment prospects for the next several years are very good, and although not many additional workers will be needed thereafter, the outlook will continue to be good for those already at work in the trade.

The prospects for structural workers are improved by developments in the use of steelwork intended for buildings with light floor loads. There has also been increased recognition of advantages of steel construction in some kinds of one-story nonresidential buildings. The possibilities of a fairly new type of unconventional design ("rigid frames") are likely to be realized much more fully than in the past.

For ornamental metal work the prospects are likewise good. It is admirably suited to recent trends in architectural design; there has been steady progress in its fabrication; and it is likely to be used more extensively in buildings where cost is a leading consideration, because the building can get a greater range of stock and semi-stock parts (such as extruded mouldings). Strictly utilitarian uses are likely at least to be sustained, if not to increase.

Some workers will also be needed to replace those who leave these trades because of death, retirement, or shifting to other kinds of jobs.

*Earnings and Working Conditions*

In July 1947, wage rates specified in union contracts for structural and ornamental workers (construction) in various localities throughout the country averaged \$2.12 an hour. The wage rates ranged from as low as \$1.67 in some localities, to as high as \$2.50 in others. Minimum wages in some of the representative cities for structural workers as of July 1947 are shown here. In

general the rates were the same or only a few cents lower.

Atlanta, Ga.....	\$1. 75	Milwaukee, Wis....	\$1. 85
Baltimore, Md.....	2. 15	Minneapolis, Minn..	2. 00
Birmingham, Ala....	1. 90	Nashville, Tenn.....	1. 88
Boston, Mass.....	2. 00	New Haven, Conn....	2. 25
Buffalo, N. Y.....	2. 15	New Orleans, La....	1. 88
Chicago, Ill.....	2. 20	New York, N. Y.....	2. 50
Cincinnati, Ohio....	2. 10	Omaha, Nebr.....	1. 93
Cleveland, Ohio....	2. 25	Philadelphia, Pa....	2. 40
Denver, Colo.....	1. 88	Pittsburgh, Pa.....	2. 25
Houston, Tex.....	2. 00	Portland, Oreg.....	1. 95
Indianapolis, Ind....	2. 13	Richmond, Va.....	2. 00
Jackson, Miss.....	1. 75	St. Louis, Mo.....	2. 25
Kansas City, Mo....	2. 05	San Francisco, Calif.	2. 25
Little Rock, Ark....	1. 88	Seattle, Wash.....	2. 14
Los Angeles, Calif....	2. 10	Springfield, Mass....	2. 03

Except for the New York area (where the structural wage rate is 25 cents per hour above the ornamental rate), hourly wage rates for structural and ornamental workers are the same or differ by only a few cents.

Workers in the erection crews receive much higher wages than do shop workers. However, structural and ornamental workers in construction are not as steadily employed throughout the year as shop workers. Since there is little maintenance and repair work that they can do during the dull building season, annual earnings usually are low relative to the hourly wage rates.

Accidents are infrequent, but in structural work are likely to be quite serious. Safety standards have been greatly improved over those prevalent 25 years ago, and safety measures such as nets and scaffoldings are used much more. Nevertheless, it cannot be expected that accidents will be completely prevented. There are occasional falls from high places, likely to be fatal unless stopped by a safety net, occasional accidents from falling objects, and once in a long while in past years there has been a catastrophe such as collapse of the structure.

*Where To Get Additional Information*

For further information about apprenticeship for either of these trades, write to the International Association of Bridge, Structural and Ornamental Iron Workers, Syndicate Trust Building, St. Louis 1, Mo., or regarding structural metal work, write to the National Erectors' Association, 33 W. 42d St., New York 18, N. Y.



## Construction Machinery Operators

(D.O.T. 5-23.010 to .620; 5-73.010 to .320 and .510 and .520)

### *Outlook Summary*

Some job openings during next several years for additional workers. Thereafter, continued employment for qualified workers.

### *Nature of Work*

Construction machinery operators (frequently known as operating engineers in the construction industry) include cranemen, derrickmen, hoistmen, and shovelmen and workers on a wide range of other machinery such as excavators, graders, pile drivers, concrete mixers, paving machines, etc. Much of such equipment is used to lift and move heavy and bulky materials on construction sites, but other machinery performs special jobs which in the past were done by hand labor. For example, in building a highway, bulldozers, power shovels, scrapers, and graders do a much faster job of clearing, excavating, and grading the right-of-way than the gang of common laborers formerly used. Likewise the concrete is mixed, placed, leveled and smoothed by machine. If a sewer is to be installed, a trench-excavating machine or ditch digger may be used to scoop out the dirt, the sewer tile lowered into place by a crane, and the dirt filled back in by dragline or a bulldozer.

The workers are often called after the machines which they operate such as cranemen, hoistmen, shovelmen, bulldozer operators, etc. The name does not mean that the worker cannot handle other construction machinery, even though he is generally specially skilled and prefers to work on one or two kinds of equipment. A capable operator during the course of his experience becomes efficient in handling several kinds and can learn to operate others within a rather short time.

### *Where Employed*

Some of the same machinery used in construction is also employed in other industries, such as metal mining, strip mining of coal, quarrying, and shipbuilding. These operations are possibly the

most frequent users—outside of the construction industry—of power shovels, hoists, cranes, derricks, and other similar equipment. But equipment of this general type is also used in many mills, foundries, and factories where heavy and bulky materials need to be moved. If the installation is more or less permanent, the machinery, such as a derrick or crane, often operates on permanently installed rails.

While the machinery used in other places is quite similar and often identical to that used on construction, it may differ in some features, being specially designed for the specific work. Most important, however, is the fact that the kind of work going on in a steel mill or a factory is entirely different from construction activity, and the machinery operator must know enough about the nature of the work where he is employed to carry out his part of the job without delay and confusion. Thus a man experienced in operating construction machinery could not step into a job operating an overhead crane in a foundry until he had a chance to learn how cranes were used in the foundry processes.

### *Training*

Learning how to operate such equipment is usually quite informal and generally accomplished on the job. Because of wide differences in complexity of operation and degree of responsibility, the newcomer on some equipment can learn to take over entirely on his own in a few weeks or months while other types of equipment require a much longer time. Apprentice programs have been inaugurated in some localities in the past few years, but apprentice training for most types of construction-machinery operators has not been widely utilized.

Many veterans received training on such equipment in the armed forces and may find their skills directly transferable to civilian jobs. Additional on-the-job training may be necessary, in some instances.

*Outlook*

A large number of power-equipment operators will be needed for the next several years. Most of the demand will come from the construction industry where activity will call for many more workers than are available at present. In addition, the producers of iron and steel, machinery manufacturers, foundries, sawmills, mines, and other heavy industries which employ cranes, derricks, hoistmen, and shovelmen must be considered. While these other industries are expected to employ a few more operators than they now have, some openings will continue to occur.

After a number of years at peak rates of activity, the demand for power-equipment operators on construction may drop somewhat, but remain at a relatively high level. An encouraging feature of the outlook is the rapid development over a number of years, of machines intended especially for comparatively small jobs. This technological advancement, which made rapid strides during the war, has meant the use of machinery and employment of operators for work which would have been done by hand not many years ago. Other industries using such operators will continue to need about as many as at present.

*Earnings*

The minimum wage rates for union workers on construction equipment in 75 selected cities, dur-

ing July 1947, ranged from \$1.63 to \$2.88 an hour for cranes and derricks; from \$1.25 to \$2.75 an hour for hoistmen, and from \$1.50 to \$2.88 an hour for shovelmen. The operators on less complicated machinery and equipment usually have lower wage rates than the ones listed above. However, because of the large difference in wages from city to city, a worker on a piece of equipment which pays the highest wages in that area may earn less than a worker on one of the lower paying jobs in another vicinity. For example, bulldozer operators working under union contracts in Cleveland, Houston, and Milwaukee made at least \$2 an hour, while shovel operators in Tampa had a minimum of only \$1.50. Then too, wages often vary even for the same job depending on the size of the machinery. To illustrate, in many localities operators of concrete mixers are paid different rates according to whether the mixer capacity was under or over five bags. It is evident then that many factors such as the locality, the kind of equipment, and its size, and frequently the experience of the operator, go into the determination of the wage rate.

Operating similar equipment on jobs in other industries, usually does not pay as much per hour as it does in construction, but steadier work on such jobs often makes the annual income considerably higher.

## Glaziers

(D.O.T. 5-77.016)

*Outlook Summary*

Job openings in the next several years for only a few additional workers. Long-range opportunities are limited to replacement needs.

*Nature of Work*

Glaziers install all types of glass, although not in all places where glass is used. In many localities the largest single part of their work has been the installation of plate glass in store windows and for other uses. They also install ordinary window glass (sheet glass) in the windows and doors of houses, apartments, and business or fac-

tory buildings, put wire glass in skylights and fire-resistant windows, set in mirrors when these are not already mounted in a frame, and install any unusual items such as preassembled stained glass or leaded glass panels.

Since it became available about 25 years ago, the glazier has installed structural glass (a non-transparent plate glass, usually polished on one surface only, made in a number of colors) as an ornamental surfacing on the exterior of buildings (usually for stores, above and below their display windows).

Glaziers install glass block under some conditions, but these are used mainly in exterior walls,

where they are set in mortar by bricklayers.

Ordinary glazing work consists of cutting the glass to size (except where stock sizes fit without cutting, which is commonly the case with steel sash), spreading a bed of putty around the edges of the opening, pressing the glass into place, fastening it with wire clips pressed into small holes in steel sash or with triangular metal points driven into the edge of wood sash, and then placing and beveling a strip of putty on the outside to keep out moisture. Plate glass, commonly cut to size at the shop rather than on the job, is held in a special supplementary frame built into the store front and partially disassembled for the removal and replacement of glass.

In many localities the wood sash and doors used in ordinary residential building are glazed at the millwork factory, by factory workers rather than glaziers. This is much less practical for steel sash, because of greater difficulty in protection during transportation, handling, and installation. Even when both are glazed at the site, steel sash is likely to mean more work for glaziers than wood sash because of the customary division into a number of small openings. While each of these can be glazed rapidly, in total they require more time than would a two-pane wood window having the same total glass area.

In small communities glazing work is frequently handled by "combination" men who also do painting and paperhanging. But in large cities it is the custom to use separate men for glazing, especially for plate glass and structural glass installations, which require much more skill than the usual glazing of windows, skylights, etc.

### Training

Glazing is a skilled craft customarily requiring 3 years of apprentice training. In most areas the trade can be entered only by way of formal apprenticeship but in some localities helpers with several years of experience may qualify and be admitted to the trade as journeymen.

### Where Employed

A few glaziers are employed in the manufacture of glass, and in various industries as maintenance workers. The great majority, however, work in

new construction or for contractors who install or replace commercial glass (store fronts, etc.).

### Outlook

The high level of construction activity which is expected to continue for at least the next few years will mean a substantial increase in the demand for glazed products. There is a definite trend toward the use of more glass in residential building. To the extent that the sash comes pre-glazed from the factory this will not increase the demand for glaziers. Where steel sash is used or where large plate glass windows are to be installed glaziers will be needed. There has been, in recent years, a very marked development of the use of glass in commercial buildings, especially retail stores. Store modernization has often been centered around improved store windows which involves a completely new glass installation. Structural glass will also be used more widely than before. Replacement of store windows broken by windstorms or other accidents is, of course, a year-round employment source for glaziers. There is a present need for additional skilled workmen, because only a few apprentices have been trained within recent years to make up for those who died or retired. In the longer run a few additional workers may be added to this relatively small occupation, but most of the job openings will be to replace workers who drop out of the trade.

### Earnings

The minimum wage rates for union journeyman glaziers in 75 cities throughout the country averaged \$1.90 an hour in July 1947, ranging from as low as \$1.25 in Jackson, Miss., to \$2.50 in New York City. Minimum wage rates for some of the representative cities are shown below:

Atlanta, Ga.....	\$1. 63	Milwaukee, Wis....	\$1. 85
Baltimore, Md.....	1. 75	Minneapolis, Minn..	1. 55
Birmingham, Ala....	1. 63	Nashville, Tenn....	1. 43
Buffalo, N. Y.....	1. 70	New Orleans, La....	1. 50
Charleston, W. Va....	1. 68	New York City, N. Y..	2. 50
Chicago, Ill.....	2. 25	Omaha, Nebr.....	1. 55
Cincinnati, Ohio....	1. 90	Philadelphia, Pa....	1. 93
Cleveland, Ohio....	2. 00	Pittsburgh, Pa.....	1. 82
Houston, Tex.....	1. 75	Portland, Oreg.....	1. 82
Indianapolis, Ind....	1. 88	Richmond, Va.....	1. 60
Jackson, Miss.....	1. 25	St. Louis, Mo.....	2. 04
Kansas City, Mo....	2. 00	San Francisco, Calif..	1. 88
Little Rock, Ark....	1. 50	Springfield, Mass....	1. 88
Los Angeles, Calif..	1. 84		

# Mechanics and Repairmen

## Automobile Mechanics

(See D.O.T. 5-81.010, .120, .420 and .510)

### *Outlook Summary*

Opportunities for skilled mechanics very good now and likely to remain so for next few years. Apprenticeship and other training opportunities decreasing. Long-run employment trend slowly upward.

### *Nature of Work*

Automobile mechanics do repair work on passenger cars, busses, and trucks. They may be either general mechanics or specialists such as auto electricians, carburetor experts, and body repairmen. Specialists other than body repairmen are usually mechanics with all-round knowledge of automotive repair who have concentrated upon one aspect of the work. Body repairmen, as a rule, are skilled only in reconditioning of fenders and bodies; they do not need and generally do not have knowledge of the engine and related parts.

### *Where Employed*

Most mechanics work in service departments of car and truck dealers or in independent repair garages. Smaller numbers are employed in garages of transportation companies and other large firms which service their own fleets, or in shops specializing in such work as battery and ignition, wheel and axle, and brake repair. Some are employed in gasoline filling stations. Many are in business for themselves, usually with the help of one or more hired mechanics.

There are auto mechanics in all parts of the country, including small rural communities. The greatest concentration, however, are in States with the highest numbers of motor vehicles—California,

nia, New York, Pennsylvania, Ohio, Illinois, Texas, Michigan, and New Jersey.

### *How To Enter*

The best way to learn the trade is to serve a 3- or 4-year apprenticeship. Such apprenticeships and also other on-the-job training plans providing less thorough preparation have become fairly common since the war. Before that, new workers generally had to start out in such jobs as helper, greaser, or washer, and gradually pick up a knowledge of the trade. Many people still enter the trade in this way. Those who do so should, if possible, supplement their work experience with trade-extension training in related technical subjects. They should also try to get a broad knowledge of the construction and function of all parts of a car and of different types and makes of motor vehicles, to help in competing for jobs or business later on.

Veterans introduced to the trade in the armed forces generally need further training for civilian jobs, since most armed-forces experience in automobile maintenance is limited to one narrow specialty. Often, these men can obtain advanced status as apprentices.

Young people under 18 should, if possible, complete at least 2 years of high school before beginning on-the-job training or entering a vocational school. Courses in English, general science, physics, and mathematics are particularly valuable.

### *Outlook*

Employment of auto mechanics has been rising sharply during the past 2 years, as experienced

workers have returned to the trade from the armed forces and war industries and some new mechanics have completed their training. The number working today is greater by a good many thousand than in 1940, when about 377,000 were employed. Demand for repair services has gone up still more rapidly, however; not only is the average age of cars much higher (in 1946, it was 9 years, as against 5.5 years in 1941) but the number of motor vehicles in use exceeds prewar levels. Skilled all-round mechanics are in great demand, and those with business ability may still find favorable opportunities to open their own shops. However, so many workers, especially veterans, have recently entered training that apprenticeship and other training opportunities are becoming less and less plentiful.



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Automobile mechanics doing a major overhaul job on a cylinder block.

In the next few years, the number of new cars manufactured is not expected to be sufficient to meet the backlog of replacement demand, and the average age of cars in use will continue to be high. This factor, plus further growth in the number of cars on the roads, will keep demand for repair work at a high level and will probably create some further employment opportunities for mechanics. Over the long run, employment will probably continue to rise, assuming continuing high levels of business activity, but the gains will be

slow. Most job openings will come from turnover, which creates thousands of vacancies in the trade each year.

#### *Earnings and Working Conditions*

Class A mechanics had average straight-time pay of about \$1.60 an hour in July 1947, according to a survey of independent general repair shops and dealer-service departments in 32 large cities. Average hourly pay ranged from \$1.24 in Providence, to \$2.05 in Detroit. For less skilled, class B mechanics, average straight-time hourly earnings were \$1.15 in the 32 cities, ranging from 78 cents an hour in New Orleans to \$1.62 in Cleveland. Automobile electricians earned more than the class A men (\$1.75 an hour, on the average); body repairmen made still more (about \$1.80 an hour). In general, wage rates were substantially higher in the Pacific coast and Great Lakes cities than in other regions. Within cities, pay varies widely, depending upon the individual's skill, the size and location of the shop and, especially in shops having incentive wage plans, the volume of business done. Earnings in small rural towns tend to be considerably lower than in cities.

In the southern cities surveyed in mid-1947, the usual workweek was 48, 50, or 54 hours. In practically all the cities in other parts of the country, it was 40 or 44 hours. Most repair shops in large cities give their mechanics vacations with pay. Many pay them for holidays. Work is fairly steady throughout the year.

Unionization is not very widespread among mechanics, taking the country as a whole. The region where they are most highly organized is the west coast, but there is some unionization in other parts of the country, particularly in large cities.

#### *Where To Go for Further Information*

Employment Outlook for Automobile Mechanics. Bulletin No. 842. U. S. Department of Labor, Bureau of Labor Statistics, 1945. Washington: U. S. Government Printing Office, 1945. Price 10 cents.

U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce. Establishing and Operating an Automobile-Repair Shop. Industrial (Small Business) Series No. 24. Washington: U. S. Government Printing Office, 1946.

## Diesel Mechanics

(D.O.T. 5-83.931)

### *Outlook Summary*

Employment opportunities for new workers or those who have only specialized Diesel-engine training will be greatly limited because most job openings go to mechanics with general experience in engine servicing. Prospects for experienced engine mechanics with knowledge of Diesel maintenance are highly favorable, both during the next few years and over a longer period.

### *Nature of Work*

Diesel-engine mechanics maintain and repair Diesel engines. Their duties include diagnosing engine trouble, disassembling the engine, replacing or repairing defective parts, reassembling the engine, and adjusting the fuel and air valves. The Diesel engine, which is almost always oil-fueled, is similar to the gasoline (or carburetor) engine in many respects. From the point of view of the mechanic, the essential difference between the carburetor engine and the Diesel engine lies in their different methods of ignition. The Diesel engine has no electric ignition system or carburetor such as is found in the gasoline engine, but has an oil-injector system and fuel pumps, with which the mechanic must be familiar. However, the basic stationary and working parts are similar in both engines. As a result, Diesel-engine maintenance is usually carried on by workers who are employed as engine mechanics rather than as specialized Diesel mechanics. For example, Diesel-powered busses, trucks, tractors, and construction machinery are usually maintained by automobile or tractor mechanics, and railroad machinists generally repair Diesel locomotives.

### *Training and Qualifications*

Most mechanics who repair Diesel engines have had training and experience on other engines. Qualifications for Diesel maintenance jobs vary among industries. Mechanics employed in servicing and repairing Diesel locomotives are drawn from among railroad machinists, who are usually

required to serve a 4-year apprenticeship. Marine engineers, who are in charge of the operation and maintenance of Diesel engines on ships, must be licensed by the United States Bureau of Marine Inspection and Navigation. Experience in the engine departments of ships and a written examination are among the chief requirements for a marine license. Mechanics who service Diesel engines in the vehicular field, including trucks, busses, tractors, and construction machinery, generally are gasoline-engine mechanics who have learned how to repair Diesel engines. There are a number of schools which provide instruction in Diesel engine repair and maintenance. Such training is most valuable when it supplements experience in gasoline-engine maintenance. Those without actual experience who take courses in Diesel theory and practice will find it difficult to qualify directly for a job as Diesel mechanic.

### *Where Employed*

Diesel maintenance jobs are found in a wide variety of fields that use Diesel engines. Among the more important sources of employment are bus lines, trucking companies, railroads, ships, electric power plants, large farms, logging camps, marine-engine repair establishments, and large buildings and factories. Garages and firms that service Diesel tractors and construction machinery also have Diesel repair jobs.

### *Outlook*

Diesel-engine production increased greatly during the war, and all indications are that Diesels will become even more widely used. Most of the new locomotives ordered by the railroads are Diesels; more Diesel trucks and busses are on the highways; and thousands of Diesel tractors are sold to farmers annually. This points to a continued increase in the number of Diesel maintenance jobs, which will go to mechanics, for a number of years at least, who already have experience in repairing other types of engines. For example, a company

changing over to use of Diesel engines will usually assign experienced mechanics already on its pay roll to service the Diesel equipment, and give them the slight retraining necessary. Other companies who are filling expansion needs with Diesel engines will hire experienced engine mechanics wherever possible. Those with specialized Diesel training acquired in schools, but without engine repair experience will be at a disadvantage. In addition there are many fields in which Diesel engines are used where seniority rules are observed so that engine mechanics with the longest work experience have the first choice when Diesel maintenance job openings appear.

Eventually, as Diesels come into greater use, on-the-job training opportunities for inexperienced applicants may become more common. Diesel engines are likely, however, to continue to be but a very small proportion of all engines in use. Unless unexpected developments occur, they will not

be used to any appreciable extent in passenger automobiles.

#### *Earnings*

Because Diesel servicing is usually considered as part of a broader job, and not a separate and distinct field, information on the earnings of Diesel mechanics as such is generally not available. The earnings of automobile mechanics are probably typical of those of many Diesel mechanics. In July 1947, class A automobile mechanics employed in large cities, had average earnings of about \$1.60 an hour, excluding premium pay for overtime work.

#### *Where To Get Additional Information*

Employment Opportunities for Diesel-Engine Mechanics (Bulletin No. 813). U. S. Department of Labor, Bureau of Labor Statistics, 1945. 10 pp. 5 cents. Superintendent of Documents, Washington 25, D. C.

## Industrial Machinery Repairmen

(D.O.T. 5-83.641)

### *Outlook Summary*

Long run prospects are for the gradual increase in employment. Replacement needs, however, will provide most of the openings for new workers.

### *Nature of Work*

Industrial machinery repairmen, often called maintenance mechanics, maintain and repair machinery and other mechanical equipment in all types of industrial plants. Their duties include examining the machinery to determine cause of trouble, dismantling machinery, repairing or replacing defective parts, reassembling machinery, and making necessary adjustments for efficient operation. Often some of the duties of the millwright in the moving and assembling of machinery and equipment are included. Maintenance mechanics usually specialize in the type of machinery or equipment used in the industry in which they are employed, and generally are required to have a knowledge of the operation of the machines which they repair.

### *Where Employed*

These workers are employed in almost every type of industrial plant which uses any great amount of machinery or equipment. Many industrial machinery repairmen are employed in metal-working establishments including plants making automobiles, electrical equipment, iron and steel products, and machinery. Other groups work in non-metal-manufacturing industries such as textile mills, chemical plants, and paper and pulp mills; several thousand are employed in coal and metal mining.

Because industrial machinery repairmen do maintenance work in such a wide variety of industries, they are employed in every section of the country. These workers are concentrated, however, in the principal industrial regions including Michigan, Pennsylvania, Ohio, Illinois, New York, and California.

### *Training and Qualifications*

The amount of skill and training required for industrial machinery repairmen varies widely

with the type of machinery and equipment in the plant. Training is usually obtained on the job, particularly since workers often specialize on one type of equipment. In many plants, machinists or machine operators are transferred to the maintenance department to do this job; in other plants inexperienced workers are hired as helpers and learn the job while working. A 3- or 4-year apprenticeship may be required by some firms.

### *Outlook*

During the next few years and also in the longer run there should be a small number of opportunities each year for new workers to enter this field. The growing mechanization of industry is expected to gradually increase the need for maintenance mechanics to keep production equipment in working order. However, most of the openings for

new workers will result from the need to replace persons who switch to other jobs, retire, or die, rather than from any increase in employment.

### *Earnings*

Industrial machinery repairmen are generally among the best paid maintenance workers. Earnings for these workers vary considerably among industries. In October 1946, maintenance mechanics employed in the machinery industries (except electrical machinery, machine tools, and machine tool accessories) in large cities had average straight-time hourly earnings of \$1.37. In independent ferrous foundries during the same period they averaged \$1.25 an hour. Since the latter part of 1946, industrial machinery repairmen have had wage increases in many plants.

*See also* Millwrights, page 286.

## Airplane Mechanics

(D.O.T. 5-80.120 and .130)

### *Outlook Summary*

Employment prospects good for skilled mechanics between now and 1950; also rising number of openings for apprentices. Outlook still more favorable in longer run, on basis of present defense plans.

### *Duties*

Air-line mechanics are assigned either to line maintenance or to overhaul work. Line-maintenance men are mostly all-round aircraft and engine mechanics. They service and inspect the air liners and their power plants and instruments, and make minor repairs and adjustments. When an engine or other part has to be sent to the main overhaul base for major repairs, they remove it from the plane and install new or overhauled equipment in its place.

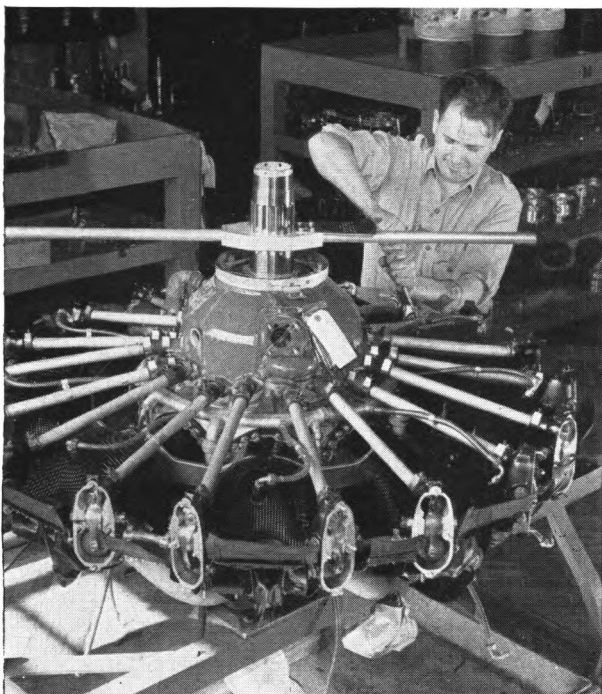
Mechanics at the main base usually specialize in engine or airplane overhaul or in some other division of the work, such as overhaul of electrical equipment, radio servicing, instrument work, painting, or upholstering. In general, the larger the base, the greater is the specialization of work.

Outside the air lines, most mechanics do servicing and inspection work roughly comparable to that of the air-line line-maintenance men; few are in shops which handle overhaul work. The planes which these mechanics service are, as a rule, very much smaller than air liners; often they have only a few comparatively simple instruments, no radio, and no elaborate propeller mechanism. However, a single mechanic usually has to do the entire servicing job with little supervision, and has to be able to work with many different types of planes and engines. It is estimated that one good mechanic and a helper can take care of the line-maintenance requirements of 8 to 10 light planes, if the work is properly organized.

### *Where Employed*

Easily half of all mechanics work for the 28 scheduled air lines engaged in interstate and foreign commerce. Of the remainder, by far the greatest number are employed in fixed-base operations (a term which is often used to refer to the great variety of commercial and industrial flying services, flying and ground schools, and independ-





An engine mechanic reassembling an air-line engine which had been torn down for overhauling.

ent repair shops) of which there are about 5,000 in all parts of the country. Some men operate their own small repair shops, with or without the help of hired mechanics. Other employers are Government agencies and aircraft factories.

Mechanics are employed in more different parts of the country than most other types of aviation workers. However, large numbers of all-round mechanics and almost all specialists work at the main overhaul bases located in 55 different cities.

### *Qualifications*

To qualify as a skilled mechanic or specialist, a 4-year apprenticeship or its equivalent is usually involved. For many jobs, a CAA mechanic certificate with an aircraft mechanic "A" or aircraft engine "E" rating or both is legally required. The certificate system may be extended to provide for special ratings for radio and electronics mechanics and possibly other types of specialists not at present covered.

In competing for apprentice jobs, applicants will find high-school or trade-school education—including such subjects as mathematics, physics, chemistry, and machine shop—a great advantage,

when not a definite requirement. Experience in automotive repair or other mechanical work is also helpful. In addition, it is customary for apprentices to own a sizable kit of tools. Mechanics coming out of the armed forces generally need some retraining for licenses and for jobs above the apprentice or helper level. Most air lines require a generally rigid preemployment physical examination, though waivers are allowed in some instances.

The line of advancement is to such positions as lead mechanic, crew chief, shop foreman, chief mechanic, and, finally, supervisory and executive positions in maintenance departments. After some additional training, radio specialists may become ground or flight radio operators and advance in these fields.

### *Outlook*

Continued growth of air-line traffic and increased activity in other branches of aviation will make for expanding employment of mechanics both in the near future and over the long run. In early 1948, well over 20,000 mechanics were employed, exclusive of those in aircraft plants, according to a rough estimate. By 1950, jobs may be half again as numerous in the transport segment of the industry alone, provided that general economic activity remains at a high level. A far greater expansion will occur in aircraft construction and related activities, stemming from the 70-group Air Force program legislated in May 1948. Hiring will soon become sufficiently heavy to cut down considerably or even wipe out the surplus of applicants which has existed in many parts of the country during the last 2½ years.

There is, however, a great reservoir of potential apprentices and journeymen, including men now working as helpers, some of the tremendous number of veterans who did mechanics' work in the military and naval air forces, and other groups. In 1947 alone, more than 3,000 men finished mechanic training in CAA-approved schools, and upward of 10,000 were taking courses at the end of the year. Large numbers will continue to be trained each year. For these and other reasons, serious shortages of full-fledged mechanics and apprentices may not develop at least in the next year or two.

In the longer run, virtually all qualified journeymen and peak peacetime numbers of apprentices should be able to obtain positions, until defense plans affecting air power are significantly altered. Highly experienced and skilled men will be in an extremely favorable position reminiscent of wartime, with no competition in job seeking and excellent chances for advancement. Specialists, notably those who are also qualified for general "A" or "E" work, will be in particular demand, especially as the manpower situation begins to tighten.

#### *Earnings and Working Conditions*

For most newly hired air-line mechanics and specialists, the starting rate of pay was upward of \$1.35 an hour in early 1948. Wages went as high as \$1.80 or more for men with several years' service. Mechanics in fixed-base operations tend to make as much as or more than air-line mechanics, according to very limited data; the proportion of licensed men, particularly "A" and "E" men, is much higher in fixed-base operations than with the air lines. Salaries of CAA inspectors range from about \$2,800 to well over \$6,000 a year.

The air lines usually give their men 2 weeks' vacation with pay. CAA employees, like most other Federal personnel, receive 26 days of paid annual leave per year.

Mechanics are covered by union agreements on practically all air lines. Several different unions are involved—the International Association of Machinists (Independent); the United Automobile Workers (CIO); and the Transport Workers Union (CIO).

#### *Where To Get More Information*

Detailed information on the occupation of airplane mechanic:

U. S. Department of Labor, Bureau of Labor Statistics. *Employment Opportunities in Aviation Occupations, Part I—Postwar Employment Outlook; Part 2—Duties, Qualifications, Earnings, and Working Conditions.* Bulletins No. 837-1 and 837-2. Washington: U. S. Government Printing Office, 1945 and 1946. Price 10 cents and 20 cents.

To find out about openings with air lines and the exact qualifications needed, one should write to the personnel managers of the lines. Addresses are listed in part 2 of the bulletin just mentioned or may be obtained from the Air Transport Association of America, 1107 Sixteenth Street NW., Washington, D. C.

Men interested in setting up their own aviation businesses should consult State aviation commissions and local chambers of commerce; also the following publication:

Department of Commerce, Bureau of Foreign and Domestic Commerce. *Opportunities for Establishing New Businesses in Aviation.* Washington: U. S. Government Printing Office, 1946.

Information as to locations of air fields, repair stations, and flying schools can be obtained from the Office of Aviation Information, Civil Aeronautics Administration, Washington 25, D. C. For information regarding Federal Government positions, address this agency or any regional office of the United States Civil Service Commission.

*See also:* Automobile Mechanics, page 198.

## Flight Engineers

(D.O.T. 5-80.100)

#### *Outlook Summary*

Openings will be few at best both in near future and over the long run and will be filled principally by promotion from within.

#### *Nature of Work*

Practically all flight engineers are employed by scheduled air lines on four-engine planes and, so

far, mainly in overseas flying. Some types of planes have special stations for these airmen. A recent development involves the use of a pilot in a dual capacity of pilot-engineer.

Flight engineers are responsible for the proper functioning of the aircraft and engines in flight, permitting the captain and copilot to concentrate more fully on piloting the aircraft. In the air, their duties include watching and keeping logs on

engine performance, operating certain controls under the direction of the captain, and making emergency repairs. At stops where there are no mechanics, they do needed maintenance work themselves (unless a regular mechanic is carried along for this purpose); at other stops, where there are mechanics, they direct the servicing of the plane.

Most engineers are stationed in or near coastal cities where the overseas operations are based. Some few are stationed elsewhere in the United States and overseas.



The flight engineer of an overseas air liner noting dial readings on his log.

### *Qualifications*

Every engineer (including pilot-engineers) is legally required to have a Civil Aeronautics Administration Flight Engineer certificate. This calls for a broad knowledge of such subjects as flight theory, aircraft performance, fuel consumption, and aircraft loading. Written and practical tests are given to determine not only the adequacy of the engineer's grasp of these and related subjects, but also his skill in repair work. Rigid physical examinations, repeated at intervals, must be passed. In promoting ground mechanics (the principal method of filling flight-engineer openings), or hiring from outside, the air lines frequently emphasize specified personal characteristics and education. Air Force veterans will prac-

tically always need experience in air-line ground maintenance to qualify for flight jobs.

### *Outlook*

Employment will rise somewhat over the years with increased use of larger planes and lengthening of nonstop flights. Federal action affecting the carrying of flight engineers (such as CAA's recent ruling that it would not certificate a specified type of aircraft without a flight engineer's station) may also tend to increase employment in this occupation, depending on the extent to which pilots are used to meet the new requirements instead of non-pilot engineers (see p. 92). But the total will remain small. At the war's end there were no more than a few hundred men working as flight engineers; the occupation is still of this general magnitude. Under the most favorable circumstances it should be several years before the number employed exceeds 1,000, even if general business activity remains at high levels.

There are certain to be thousands of candidates to fill these jobs from the air lines' ground maintenance staffs, and from the great number of former flight engineers and ground mechanics of the military and naval forces. There is now an oversupply of qualified applicants for flight-engineer positions, and the condition is likely to persist indefinitely. The surplus will be only moderately reduced by the planned air-force expansion.

### *Earnings and Working Conditions*

Typical earnings of fully qualified flight engineers range from \$300 to \$600 a month, depending mainly on length of experience. For some men, higher earnings can come with promotion to copilot and higher positions or to chief engineer. Eighty-five flight-hours a month (or 255 a quarter, in international flying) is a maximum schedule, with some added time spent in ground duties.

Men in international operations generally get a month's paid vacation each year; those in domestic flying, 2 weeks.

As a rule, flight engineers are on duty away from base about half the time. When they are working away from home, their living expenses are paid by the employing air line; often they are also allowed \$1 a day while on land, for incidental expenses.

Most flight engineers belong to and are represented by an American Federation of Labor union, the Air Line Flight Engineers Association. However, there is also an independent union, Flight Engineer's Officers Association, with a contract on at least one line.

#### *Where to Get More Information*

Detailed information on the occupation of flight engineers is given in:

U. S. Department of Labor, Bureau of Labor Statistics. *Employment Opportunities in Aviation Occupations, Part I—Postwar Employment*

*Outlook and Part 2—Duties, Qualifications, Earnings, and Working Conditions. Bulletins No. 837-1 and 837-2. Washington: U. S. Government Printing Office, 1945 and 1946. Price 10 cents and 20 cents.*

Inquiries in regard to job openings should be sent to the personnel managers of the lines. Addresses are listed in part 2 of the bulletin just mentioned, or may be obtained from the Air Transport Association of America, 1107 Sixteenth Street NW., Washington, D. C.

*See also: Airplane Mechanics, page 202 and Airplane Pilots, page 92.*

## Electrical-Household-Appliance Servicemen

(D.O.T. 5-83.04)

#### *Outlook Summary*

Good prospects for experienced men during next few years; also a limited number of openings for newcomers. Long-run trend of employment upward.

#### *Nature of Work*

Main duties of servicemen are to install, maintain, and rebuild large appliances such as ranges, stoves, and washing machines, and to repair smaller ones such as irons and toasters. These workers may also install and service refrigerators and radios, though they are seldom expected to handle major repairs on these types of equipment. Many sell appliances and replacement parts and give instructions to customers on their proper use and care. They use hand tools, such as screw drivers, pliers, wrenches, files, and hack saws; also a few machine tools, such as small drill presses and buffer-grinders.

These repairmen are employed mainly in service departments of stores and other concerns selling electrical household appliances and in shops specializing in the repair of such appliances. A good many men have their own shops; a few work for appliance manufacturers and electric companies.

#### *Training*

On-the-job training is one of the best ways of entering the trade. Many employers offer opportunities for this. Hundreds of trade, correspond-

ence, and other schools also give courses in fundamentals of electricity and in operation and construction of various types and makes of appliances. To be considered fully qualified, however, a worker must have had practical work experience; it takes several years' experience to become a skilled mechanic.

#### *Outlook*

There will be many openings in this expanding field during the next few years. The number of mechanics now employed may be as high as 50,000, not counting those who have their own service shops or dealers who themselves do service work. Employment is no doubt thousands greater than at the end of the war; not only have many veterans returned to their jobs, but considerable numbers of newly trained men have entered the field. The serious wartime shortage of mechanics has thus been much relieved, but more workers are still needed. Sales of appliances are expected to be high during the next few years; this will mean much work for servicemen, especially in view of the guaranties given on new appliances. Manufacturers and power companies are urging dealers to set up high-quality service departments or arrange for reliable service work. Besides numerous openings in skilled jobs, there will also be some opportunities in beginning positions. A limited number of men with good experience and business ability will find favorable opportunities to go into business for themselves, although many

new dealer service departments and independent shops have already been started.

The occupation is likely to go on expanding over the long run, since the future is promising for electrical household appliances. About a quarter of a billion are now in use; most homes have at least one appliance; many, two or more. It is expected that the total number will continue to increase. In addition, replacement needs will remain high. Competition for jobs and business is likely to become keener, however. More and more, men seeking jobs or wanting to go into business for themselves will need good personal qualifications and training. Whether they find openings will also depend increasingly on the types and makes of appliances on which they specialize.

Opportunities are to be found in all parts of the country. Some regions—the Pacific Northwest and Tennessee Valley, for example—use more

appliances than others in proportion to population. In general, prospects are likely to be best in such areas, at least in the immediate future. The particular city and neighborhood where one locates will probably become a more and more important factor in success in business or in finding a job.

#### *Where To Go for Additional Information*

Servicemen interested in going into business for themselves will find valuable information in:

U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, Establishing and Operating an Electrical Appliance and Radio Shop. Industrial (Small Business). Series No. 28. Washington: U. S. Government Printing Office, 1946. Price 35 cents.

*See also:* Radio Servicemen, p. 210, and Refrigerator Servicemen and Refrigeration and Air-Conditioning Mechanics, page 208.

## Electrical Repairmen

(D.O.T. 4-97.420)

### *Outlook Summary*

More apprentices will be needed during the next 3 to 5 years. Long-range outlook good.

### *Nature of Work*

It is the electrical repairman's job to keep wiring, motors, switches, electrical mechanisms, and other electrical equipment in operating condition, and to make repairs when equipment breaks down. Sometimes they make connections, adjustments, etc., to new electrical machinery and equipment that is being installed, but such work is usually handled by regular electricians. Electrical repairmen are employed in all kinds of industries, but most of them work in transportation—railways, streetcars, and busses—in communications, such as telephone and telegraph, and in other public utilities. The remainder work mostly in retail stores, in manufacturing plants, or for the Government.

### *How to Qualify*

Although a 4- or 5-year apprenticeship is usually considered necessary to qualify a man as a journeyman electrical repairman, some get the necessary experience and training by working as

helpers for several years. A veteran with experience in electrical work in the service may be eligible for admission to the trade as an advanced apprentice.

### *Outlook*

Both the immediate and long-range outlook are very good. During the war there was a substantial demand for more electrical repairmen to take care of the extra work load on communications, transportation, etc., and to replace those going into the armed forces. However, the number of apprentices trained and new helpers employed was quite small—not nearly enough to fill existing needs.

The industries which employ most of the electrical repairmen are expected to continue at high rates of activity for several more years. The large amount of new industrial plant capacity added, both during the war and since the end of the war, means more electrical equipment to be maintained. In addition new technological developments call for installations of electrical machinery, controls, and other equipment which require repairmen to service them. This means that in the long run there will be increasing opportunities in this occupation.

## Refrigerator Servicemen and Refrigeration and Air-Conditioning Mechanics

(D.O.T. 5-83.031 and .941)

### Outlook Summary

Employment prospects only fair for *servicemen* in near future; some opportunities for top-notch men but few for the less skilled. Good opportunities for journeymen mechanics, but apprenticeship openings scarce. Long-run employment trend slowly upward in both fields.

*Refrigerator servicemen* work on domestic electric refrigerators, deep freezers, small room air-conditioners, and small commercial units like display cases, beverage coolers, and reach-in boxes. They have such tasks as inspecting equipment, cleaning condensers, adding or removing refrigerant, and taking out freezing units for repair. Some also do repairs on other types of electrical household appliances.

*Refrigeration and air-conditioning mechanics* may also do repair work on small equipment, but typically they install and repair larger refrigeration and air-conditioning units and central systems in such places as factories, stores, theaters, taverns, restaurants, hotels, and office buildings. Their duties include assembling and connecting pipes and ducts, especially on installation jobs, and overhauling and repairing pumps, compressors, condensers, and other parts.

### Where Employed

*Servicemen* are usually employed by shops specializing in refrigerator repair or by retail stores and distributors who handle domestic refrigerators. Many servicemen are self-employed.

*Mechanics* usually work for heating, refrigeration, or air-conditioning contractors. Many are in business for themselves as contractors. Some mechanics are employed by manufacturers of refrigeration and air-conditioning equipment, and still others work for companies that use much equipment of these types.



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Mechanic repairing an air conditioner.

### How To Enter

On-the-job training is needed to qualify one as a skilled *serviceman*; a course at a public trade school or commercial refrigeration school may be helpful as preparation for such training. The usual way of becoming a *mechanic* is to serve an apprenticeship. Where the trade is not organized, *servicemen* sometimes learn to repair larger equipment through on-the-job training and then advance to mechanic positions. Young men are usually preferred for apprenticeships and other beginning jobs, but age requirements are generally waived for veterans.

In a few cities (including Oklahoma City, Okla. and Long Beach, Calif.) mechanics are required to have licenses. A larger number of cities require that refrigeration contractors be licensed.

### *Outlook*

*Servicemen:* For the near future, job prospects are not good in most communities. Work volume is higher than before the war, but there are thousands more men in the occupation. Not only have many veterans returned to their jobs, but considerable numbers of newly trained men have entered the field. Many more are now being trained in schools or on the job. Further opportunities for on-the-job training will therefore be limited for at least the next year or two, and competition for these openings is expected to be keen. In the case of experienced men, only those with top skills are likely to have a good chance of getting jobs or of establishing successful new repair shops.

Though there seems to be little likelihood of a shortage of men in this field, employment will probably tend to increase slowly over the long run, owing to the growing numbers of domestic refrigerators and other small units. Demand for repair services will not expand as fast as the amount of equipment in use, however, since technological improvements are reducing the amount of servicing required per unit. Men well established in the field should have good chances of keeping their jobs or businesses over the long run; the amount of work for servicemen is less affected by declines in general business activity than that for many other occupational groups.

*Mechanics:* Journeymen refrigeration mechanics will probably have good job prospects in the near future, particularly in larger towns and cities. Currently, material shortages are impeding new installations and major overhaul work. When these shortages no longer exist, many communities expect increased demand for mechanics. Apprenticeship opportunities are likely to be limited in the near future, however, since relatively large numbers are already in training.

Over the long run, the total number of men employed as mechanics will increase, owing to expanding use of commercial and industrial refrigeration and air-conditioning equipment. An increasing number of mechanics will be needed to install and repair air-conditioning equipment—mostly for commercial users, such as stores, taverns, and office buildings. Domestic systems

are still too costly for all except the comparatively small numbers of high-income families. Industrial process air-conditioning and refrigeration will also employ more and more men. Employment on commercial refrigeration, ranging in size from walk-in boxes to cold storage warehouses, will have an upward trend for many years to come.

To a considerable extent, employment of mechanics depends on the rate of new installations. If installations are curtailed in the event of a depression, the number employed on large-scale refrigeration and air-conditioning work will drop, but many who lose their jobs may be able to shift to refrigerator servicing.

### *Earnings and Working Conditions*

Typical straight-time hourly rates for mechanics working under union agreements ranged from about \$1.75 to \$2.25 in late 1947. Rates for servicemen were generally somewhat lower and tended to vary according to such factors as experience and size of community.

Many mechanics, especially in large cities, are represented by the United Association of Plumbers and Steam Fitters or the International Brotherhood of Electrical Workers. Unionization is much less extensive among refrigerator servicemen.

Except in the southernmost regions of the United States the demand for repair services and new installations is seasonal, but most mechanics and servicemen work all year. During peak summer months overtime work is customary for both groups. In the winter many mechanics work on heating equipment, and servicemen often repair other types of electrical appliances.

### *Where To Go for Additional Information*

Further information on the nature of the work, apprenticeship and other training opportunities, earnings, and other subjects may be obtained from:

Local unions of the United Association of Plumbers and Steam Fitters and the International Brotherhood of Electrical Workers.

Local air-conditioning and refrigerating contractors associations.

Those interested in going into business for themselves will find valuable information in:

U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, Establishing and Operating an Air Conditioning and Refrigeration

Business. Industrial (Small Business) Series No. 59. Washington, U. S. Government Printing Office, 1946. Price 20 cents.

*See also:* Electrical Household Appliance Servicemen, page 206.

## Radio Servicemen

(D.O.T. 5-83.411)

### *Outlook Summary*

Some openings for highly skilled AM-FM men, but occupation overcrowded with less skilled men in most areas. Excellent opportunities for men thoroughly trained in television expected in many cities. Long-run employment trend upward.

### *Nature of Work*

Radio servicemen mainly repair home radios. They may also install and service other electronic equipment such as interoffice communication and public-address systems and warning devices. A growing number specialize in work on television

sets. Sometimes radio repairmen sell and service other electrical appliances.

A majority of those working on AM-FM sets are self-employed; some repair radios during their spare time only. Other AM-FM men are employed by large repair shops, radio stores, garages, wholesale distributors, manufacturers of electronic equipment, and other types of concerns. Television servicemen are so far employed mainly by manufacturers, distributors, and some large retail dealers.

### *How To Enter*

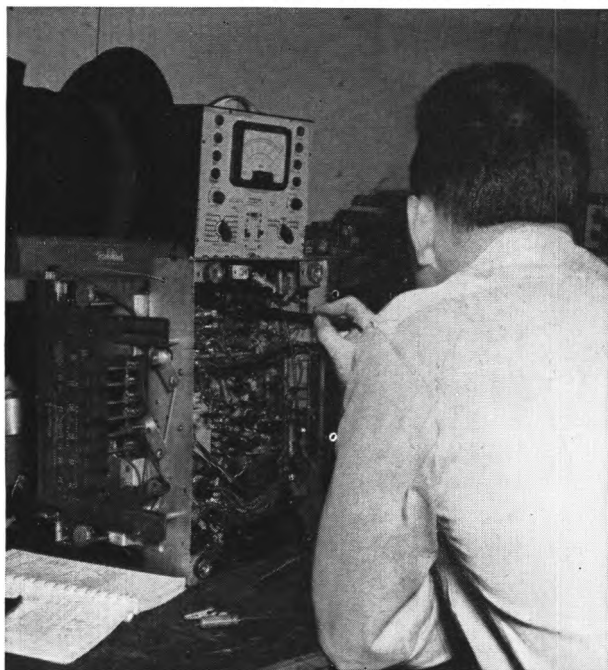
Most AM-FM radio repairmen receive their early training from correspondence courses, at technical schools, in the armed forces, as apprentices, or through "ham" radio activities. The quality of the initial training varies greatly; as a consequence there is a wide range in degree of skill among new entrants in this occupation.

Television repairmen need much more basic training and knowledge of radio theory than AM-FM men. Because there are at present so few men who can repair television sets, one of the leading manufacturers is assisting its distributors and dealers to train topnotch AM-FM servicemen in television by furnishing training materials and, where necessary, instructors. Another large company, which employs television servicemen directly, trains its men through a combination of factory classroom work and on-the-job training. It is also possible to obtain training in television work at the better radio schools.

Men going into business for themselves as AM or FM repairmen must have at least \$500 for tools and equipment. The additional equipment needed to service television sets costs several hundred dollars.

Radio repairman locating "trouble" in a home receiver.

PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR





### *Outlook*

Highly skilled, experienced AM-FM men should be able to find job openings in most areas in the near future, but the field as a whole is overcrowded. In most parts of the country there is a surplus of inexperienced and inadequately trained radio repairmen.

The number now in business for themselves full time is roughly estimated at 50,000, about twice the prewar figure. Many of the newcomers are veterans who were trained in the armed forces; others were employed as technicians in electronics manufacturing plants during the war. Because there are already more than enough repair shops in most areas, favorable opportunities to start new shops are rare. To succeed in a new business, servicemen will need a high degree of skill and business ability as well as an unusually good location.

Television specialists will find good opportunities in areas reached by telecasts (anywhere within about 50 miles from a television station). By December 1, 1947, there were 17 operating television stations in 11 large cities. The Federal Communications Commission had issued construction permits or had applications pending for 97 more stations which would provide service to a total of 54 cities and their environs; it is expected that the number of construction permits will increase greatly within a few months. Though less than 200,000 television sets were in use in early 1948, their number is increasing rapidly, as is the need for men to install and service them.

Over the long run, employment of radio repairmen is likely to rise slowly. About 90 percent of all families in the Nation already have radios, but the proportion is still rising and the number of sets per family is increasing. In the 3 years between 1944 and 1947, the proportion of families with two or more radios rose from 18 percent to 34 percent, according to one estimate. Radio ownership and the total demand for repair services will be further increased by the anticipated

growth in population and number of families. As television sets multiply, they will increase the need for repairmen; television receivers are much more complicated than AM-FM radios and require more servicing. Servicemen with television training will have a greater and greater advantage over those with knowledge of AM and FM only, both in competing for jobs and in trying to make a go of their own repair businesses.

### *Earnings and Working Conditions*

AM-FM repairmen have lower wage rates than many other groups of skilled workers. Typical weekly wages were between \$40 and \$60 in mid-1947 for servicemen in many metropolitan areas. Men who have their own shops often have low incomes; those who combine radio repair with sales of radios and other appliances usually earn more than those who do repair work only.

Repairmen employed by others usually work between 44 and 48 hours per week. Taking the country as a whole, only a small proportion of radio servicemen are union members; most of those organized are in large cities.

### *Where To Go for More Information*

Some communities have radio servicemen's organizations that can provide information on employment opportunities, wages, and working conditions. Servicemen interested in going into business for themselves will find valuable information in:

U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce. Establishing and Operating an Electrical Appliance and Radio Shop. Industrial (Small Business) Series No. 28. Washington: U. S. Government Printing Office, 1946. Price 35 cents.

*See also:* Electronic Technicians (Commercial and Industrial Servicing); page 212, Electronic Technicians (Electronics Manufacturing); page 213; Radar Technicians, page 214; and Radio Operators (Broadcasting), page 87.

## Electronic Technicians (Commercial and Industrial Servicing)

(D.O.T. 5-83.449)

### *Outlook Summary*

Technician jobs in industrial servicing generally filled by promotion of electricians. Commercial servicing is small but expanding field with more job seekers than openings for the present.

### *Nature of Work*

The main duties of technicians in these fields of work are installing, servicing, and repairing electronic equipment.

Technicians in manufacturing plants maintain and repair such devices as electric current controls, electronic precipitators, counting mechanisms, and certain types of welding and heating equipment. When an engineer installs a new electronic device, he usually instructs plant electricians in maintenance and simple repairs. Later, when there are enough electronic instruments in the plant to warrant having a full-time electronic technician, the man chosen for the job is likely to be the electrician who has been working with the equipment and studying electronics. In smaller plants or those using few electronic devices, minor maintenance and repair work may be handled by general maintenance mechanics, the distributor's engineers, or commercial servicemen; when major repairs are needed, the distributor's engineers are called in.

Office buildings, hotels, stores, and other commercial structures use devices such as wire recorders, office intercommunications systems, and warning equipment. These are serviced by several different groups. Much of the work is still being done by the distributor's engineers, because the instruments employ principles with which regular electrical repairmen are not familiar. Sometimes, when electronic devices have been incorporated in machinery (for example, when electronic floor-leveling mechanisms became part of elevator equipment), the regular repairmen have expanded their training to enable them to service the new electronic features. Also, there are commercial servicing organizations which often employ technicians, as well as engineers, to take care of the wide variety of new electronic instruments. In

addition, radio shops and individual repairmen often service some types of electronic equipment.

### *Training*

Electronic technicians in commercial servicing are expected to have sound backgrounds in electronics and fundamentals of electricity. Usually those hired must show evidence of study in the field of electronics at one of the reputable technical schools or certain Army or Navy schools, or have had equivalent training. Applicants must also prove their ability on actual repair jobs.

### *Outlook*

Few men trained primarily in electronics will find openings as technicians in manufacturing plants, though the use of electronic devices in such plants is expanding and industrial concerns are doing more and more of their own servicing (instead of having it done by the distributor's engineers). The additional technicians needed in factories will continue to come mostly from the ranks of electricians already on the company pay roll. Electricians' unions are encouraging members to prepare themselves for taking over the servicing of electronic devices.

Servicing of electronic equipment in commercial establishments provides a long-term expanding field for electronic technicians. An increasing share of the work will probably be done by technicians employed by radio and commercial repair organizations. For the present, however, there is an oversupply of jobseekers with some training in electronics. Many of those who might hold jobs in less exacting electronic occupations such as routine testing in radio manufacturing will not be qualified for commercial work, since it often demands a high degree of skill and knowledge of electronics.

### *Earnings*

In industrial servicing, wage rates are generally just above those of regular maintenance electricians in the same plants. Wage rates for tech-

nicians in commercial servicing have not yet crystallized; it is expected that these hourly rates will be slightly higher than those for ordinary radio repairmen in the same area.

*See also:* Radio Servicemen, page 210; Electronic Technicians (Electronics Manufacturing), page 213; Radar Technicians, page 214; and Radio Operators (Broadcasting), page 87.

## Electronic Technicians (Electronics Manufacturing)

(See D.O.T. 4-98.999)

### *Outlook Summary*

A number of openings in radio and other types of electronics manufacturing in the near future. Long-run employment trend upward in all branches of the industry.

### *Nature of Work*

Technicians in radio and other electronics manufacturing are employed mainly as testers and inspectors. Large companies also employ small numbers as assistants to engineers and scientists in experimental laboratories.

The testers' primary job is to check completed equipment for defects and to locate the source of malfunctioning. In some plants they are also responsible for making needed repairs.

Those on low-grade jobs in radio manufacturing usually do routine testing and need have little knowledge of the theories of electronics. In other electronics manufacturing, the equipment produced is more varied and intricate; it is often made to order rather than mass produced. In this type of manufacturing, even the lowest-grade testers must have some background in electronics.

### *How To Enter*

A 12-month course at a reputable technical school or the equivalent of such training is generally required for tester and inspector positions (except low-grade jobs in radio manufacturing). Completion of a year's course at an Army or Navy school is usually considered adequate preparation. Workers usually enter the occupation either directly from school or from radio-technician jobs of other kinds; tester positions are seldom filled by up-grading less-skilled production workers. Advancement is possible from the lowest-grade tester jobs to the highest. Men who have unusual ability may be promoted to engineering positions.

### *Outlook*

Employment of testers is likely to increase both in the near future and over the long run. Only a few thousand are now employed, a majority of them in radio manufacturing. In this branch of the industry, growth of television is an important factor and is expected to contribute largely to the upward trend in tester employment; television sets, which must be given many complex factory tests, probably will be produced in ever-increasing numbers for many years to come.

Other electronics manufacturing is likely to expand considerably in the next few years owing to greatly increased demand for military electronic equipment. Continued gradual growth in the manufacture of equipment for civilian use is anticipated for an indefinite number of years. It is unlikely, however, that the total number of electronic technicians in this branch of the industry will equal more than a fraction of the number in radio and television manufacturing for a long time to come.

There is now an oversupply of men with some electronic training in this as in related fields, and a continuous stream of men is seeking to enter this occupation. Well-trained, highly competent technicians have much the best chance of jobs.

Before the war, radio manufacturing was a highly seasonal industry. Most of the manufacturing was done during the fall months; the rest of the year was devoted mainly to development and research, which was carried on with a small fraction of the personnel employed during peak production. If this pattern again becomes characteristic of the industry, technicians in radio plants will be subject to temporary lay-offs in some seasons. Also, the demand for radio sets, and therefore employment in radio manufacturing, changes rapidly with the tides of general business prosperity and depression.

*Earnings*

In January 1948, average straight-time earnings for men ranged from about \$1.30 to \$1.60 per hour for high-grade tester and inspector jobs in major manufacturing centers.

Electronic technicians have earnings advantages over less-skilled production workers which are not revealed by their hourly rates. Their opportuni-

ties for promotion are considered better than average. In addition, they are sometimes kept on when other production workers are sent home because of temporary break-downs.

*See also:* Radio Servicemen, page 210; Electronic Technicians (Commercial and Industrial Servicing), page 212; Radar Technicians, page 214; and Radio Operators (Broadcasting), page 87.

## Radar Technicians

(D.O.T. 5-83.449)

*Outlook Summary*

Very small but expanding field; occasional openings for highly qualified men.

*Nature of Work*

The group covered by this statement is made up of men engaged mainly in supervising installation of radar (radio detection and ranging) equipment and in servicing and repairing such equipment; some do actual installation work. In general, duties are similar to those of radio technicians but call for greater technical knowledge and skill, since radar involves more advanced knowledge of electronic principles and more intricate equipment than ordinary radio. Also, radar technicians must be able to make reports on difficulties encountered and recommend improvements in construction and design. They often service other types of electronic equipment as well as radar.

*Where Employed*

Most radar technicians work for the very small number of concerns manufacturing and selling radar equipment and holding contracts to service military radar. The great majority are assigned to district offices of employing companies, located mainly in the big port cities. A sizable proportion are stationed in the Great Lakes and Mississippi River regions. Technicians servicing military equipment are scattered throughout the world.

*Training and Other Qualifications*

Only men with good experience or training in radar or radio are hired. Many are former radio

repairmen. Some are college graduates; at least one company considers a college degree, preferably in electrical engineering, essential. Even college-trained engineers must, however, have basic mechanical skills to be considered fully qualified as technicians. A number of schools, colleges, and radio institutes offer courses in electronics; some have well-rounded programs, including laboratory work and practice in the types of mechanical tasks met with in technician jobs. Though thousands of men were trained to operate and maintain radar equipment in the armed services, this military experience alone rarely, if ever, qualifies a man for civilian work.

New employees almost always receive on-the-job training. For entrants with especially good experience, the training period may last only a few weeks; for others, it may last a year or more.

*Outlook*

There will be a number of openings for exceptionally well qualified men in this small but expanding new field during the next year or two.

As yet, only a few hundred radar equipments are being operated on a regular commercial basis for civilian purposes. Practically all the large equipments are used in navigation of ocean-going ships or vessels sailing the Great Lakes and inland waterways. The number of such sets is expected to grow particularly fast. There will also be an increase in aviation installations (including altimeters, search radars, and ground approach and control systems). Radar weather observation and research instruments are coming into use. Another new product, a cooking range, makes use of radar's magnetron tube.

All these developments will mean more work for

technicians in supervising the installation of sets and keeping them in order. In addition, civilian technicians will be needed to service military equipment, the amount of which will be substantially increased under the rearmament program. There will be a few openings owing to turn-over. The total number of job opportunities will not be great, however. Employment will probably go on increasing over the long run.

There are now many more job applicants than openings, but few job seekers meet hiring standards. The number of qualified technicians competing for jobs is likely to become still greater in the near future, as more and more people complete well-rounded programs in electronics. For men unable to get jobs as radar technicians, there may be opportunities elsewhere in electronics—in television, for example.

In the near future, most jobs, except for work on military equipment, will probably continue to be in seaports and Great Lakes and river ports.

However, as use of radar increases in aviation and other fields, opportunities will tend to become more widespread in this country.

### *Earnings*

Fully qualified men with good radar experience are likely to make around \$4,000 for the first year or so with a company. Typical annual earnings in the occupation are between this figure and \$5,000. Men working away from their headquarters' cities have their expenses paid by the company or receive extra pay. Special bonuses may be given for overseas work. Basic workweek is usually 40 hours, with time and one-half for overtime.

*See also:* Radio Servicemen, page 210; Electronic Technicians (Electronics Manufacturing), page 213; Electronic Technicians (Commercial and Industrial Servicing), page 212; and Radio Operators (Broadcasting), page 87.

## Typewriter Servicemen

(D.O.T. 5-83.127)

### *Outlook Summary*

There will be a number of job openings for new workers during the next 4 or 5 years. The long-run outlook is for steady employment.

### *Nature of Work*

Typewriter servicemen inspect, adjust, and repair typewriters. Repair work may involve replacing worn or broken parts, alining the type to print evenly, fixing the escapement (spacer), and adjusting the shift mechanism and ribbon movement. Servicemen also clean and oil the machines. Most servicing and repair work is taken to the shop. However, minor servicing jobs may be done in the offices where the machines are used. The mechanics use common hand tools such as screwdrivers, pliers, and punches.

In some small shops, typewriter servicing may be combined with the servicing of other business equipment, particularly adding machines.

Most servicemen are bench men; that is, their work is done in the repair shop. "Outside" men

make contacts with customers as well as frequently doing some work in the shop. They inspect the customer's machines and determine whether or not they should be brought back to the shop for repair. Outside men, particularly those employed by small independent shops, may also sell typewriter ribbons and supplies; occasionally, they sell typewriters.

### *Where Employed*

Typewriter repair men are employed both in the local service branches of typewriter manufacturers and in independently owned local repair shops (which frequently sell typewriters as well as repair them). Many servicemen have their own repair shops.

Geographically, typewriter servicemen are widely distributed. Every city and large town has men employed in the occupation. However, the greatest concentration of servicemen is in large cities, where the bulk of clerical work is found.

### *Training and Qualifications*

The length and kind of training for typewriter servicemen varies. Most of it, however, is received on the job. Training periods range from 1 to 3 years. Servicemen employed in independently owned shops require more training and experience, as they must be able to repair all makes of typewriters and, sometimes, adding machines and calculators; servicemen employed in the service branches of manufacturing companies generally repair only one make of typewriter.

In many independent shops, new workers become servicemen by working as helpers, gradually picking up the necessary skills. In some independent shops and in the manufacturers' service branches, however, training schedules are set up and experienced servicemen and supervisors teach the new men systematically.

In addition, trainees in the service branches are frequently sent to a company school at the factory for a few weeks or months of intensive training. Some typewriter servicemen are trained in 2- or 3-year formal apprenticeships which include work on several makes and types of business machines.

There are at least two privately owned schools, not connected with any manufacturer, training typewriter servicemen. These schools are equipped to give additional training on servicing adding machines and calculators.

### *Outlook*

Opportunities to enter the trade during the next 4 or 5 years will be better than in most prewar years. There is a current shortage of skilled men. During the war a number of experienced servicemen went into other lines of work and have not returned to this field. Many small shops are still reluctant to take on inexperienced men because of the expense of training them. Meanwhile, the amount of repair work is increasing. The number of new workers who will find job openings in this

field will be greater than in other kinds of business-machine servicing. There are about 10,000 typewriter mechanics, who comprise nearly half of all business-machine servicemen.

Those who enter the occupation during the next few years, will have excellent chances for continued employment over the longer run. Employment in this field will tend to rise gradually as the number of typewriters in use increases. Moreover, typewriter repair work is not greatly affected by changes in general economic conditions. In poor business years, sales of new machines fall, but the amount of repair work remains fairly steady, as old machines are kept in use instead of being replaced.

### *Earnings and Working Conditions*

The typical pay of experienced typewriter servicemen for a 40-hour week in 1947 ranged from about \$45 to \$75 in the larger cities. Servicemen in independent repair shops usually earn more than men in the manufacturers' service branches, largely because men in the independent shops must be able to repair various makes of typewriters.

Many typewriter repair shops pay servicemen commissions on sales of typewriters, supplies, and contracts to do servicing for particular firms. Servicemen may increase their earnings through promotion to service supervisors or shop managers. In many cases they have opportunities to open their own shops. Typewriter servicing is light work, comparatively free from accidents, and cleaner than most other mechanical trades.

### *Where To Get Additional Information*

U. S. Department of Labor, Bureau of Labor Statistics, Employment Outlook for Business Machine Servicemen. Bulletin No. 892. Washington: U. S. Government Printing Office, 1947. Price 15 cents.

*See also:* Adding Machine Servicemen, page 217.

## Adding Machine Servicemen

(D.O.T. 5-83.122)

### *Outlook Summary*

Prospects are favorable for entry of a limited number of new workers during the next 4 or 5 years. The long-run outlook is for steady employment.

### *Nature of Work*

Servicemen inspect, adjust, and repair adding machines. Adjustments and minor repairs are usually made in the offices where the machines are used. Major repair work is taken to the shop. Repair work involves determining the cause of trouble, replacing worn or broken parts, and cleaning and oiling machines. Servicemen use common hand tools such as screw drivers, wrenches, pliers, punches, and special tools designed for the particular type of machine being repaired. In some cases servicing of both adding machines and calculators is combined in a single job. In independent repair shops, adding-machine mechanics may also repair typewriters.

### *Where Employed*

Servicemen are employed principally in large cities, where the bulk of the adding machines are used. Adding machine servicemen are employed both in manufacturer's service branches, which are operated in connection with the sales offices of the firms, and in independently owned local repair shops. Other sources of employment are in the Federal, State, and local governments and in a few large banks and other firms which use large numbers of adding machines.

### *Training and Qualifications*

The training period for adding machine mechanics ranges from 6 months to a year or more of on-the-job instruction. Servicemen employed in manufacturers' service branches generally receive a few weeks supplemental training in the manufacturers' own school, usually located at the plant. Manufacturers train men to work only on their own line of machines.

In independent shops new men may learn to repair adding machines by working as helpers. Some pick up the skill while working as typewriter mechanics.

The main aptitudes needed by a trainee are general mechanical ability and manual dexterity. Most manufacturers of adding machines prefer new trainees to be in their early twenties.

### *Outlook*

During the next 4 or 5 years, there will be jobs for a small number of trainees in adding machine repair. Most manufacturers of the equipment are conducting expanded training programs. It is necessary not only to make up for the war years during which few men were trained, but also to provide additional men to service the growing number of machines in use. Since this is a small occupation, however—there are probably about 2,000 adding machine servicemen in the country—the number of openings for new workers will be limited.

Longer run prospects are for an upward trend in the employment of servicemen. The number of adding machines in use in business and in government is tending to increase. Moreover, the repair of adding machines is little affected by changes in general economic conditions. In time of depression there are few lay-offs, since during these years the tendency is to keep old machines in repair, rather than to buy new machines.

### *Earnings and Working Conditions*

During the latter part of 1947, typical earnings for a 40-hour week ranged from \$50 to \$75. In addition, commissions are sometimes paid to servicemen and supervisors on sales of supplies and contracts to do servicing for a particular firm. Men servicing calculators, as well as adding machines, generally earn more than men servicing only adding machines.

Service mechanics may be promoted to positions as service supervisor. The weekly earnings of service supervisors range up to \$100 and over. In

manufacturers' branches, mechanics are sometimes transferred to the sales department.

Repairing adding machines is comparatively free from the danger of accident and is cleaner than most other mechanical trades. Servicemen generally dress like white-collar workers, since most service work is performed in the offices or stores where the machines are located.

#### *Where To Find Additional Information*

U. S. Department of Labor, Bureau of Labor Statistics; *Employment Outlook for Business Machine Servicemen*. Bulletin No. 892. Washington: U. S. Government Printing Office, 1947. Price, 15 cents.

*See also:* *Calculating Machine Servicemen*, page 218, and *Typewriter Servicemen*, page 215.

## Calculating Machine Servicemen

(D.O.T. 5-83.123)

### *Outlook Summary*

There will be opportunities for a limited number of new men to enter this field during the next 4 or 5 years. Long-run prospects are for steady employment.

### *Nature of Work*

These servicemen inspect, adjust, and repair calculating machines. Calculating machines, which add, subtract, divide, multiply, and also perform combinations of these operations, are used mostly in offices where a great many computations are necessary. These machines, most of which are electrically operated, have elaborate mechanisms, and, therefore, skilled men are required to repair them. Minor repairs and adjustments are made in the offices where the machines are used. Major repair work may be taken to the shop. Repairing the machine involves determining the cause of trouble in the machines, repairing or replacing broken or worn parts, and cleaning and oiling the machines. The mechanic uses common hand tools designed for the particular type of machine on which he is working. Servicemen are sometimes required to explain to new operators how to operate the machines. In some cases, servicing of calculators is combined with the servicing of other business machines, particularly adding machines.

### *Where Employed*

Most servicemen are employed in large cities, since this is where the bulk of the calculators are used. Mechanics servicing calculators are usually employed in manufacturers' local service branches

which are operated in connection with the sales offices of these firms. However, a few work in independently owned local repair shops. Most of these independent shops are small and employ only a few workers. Another source of employment is the Federal Government.

### *Training and Qualifications*

Trainees employed by manufacturers of calculating machines generally receive from 1 to 3 years of on-the-job training, often combined with a 3- or 4-month course at a company school. Servicemen employed by the manufacturers are trained to service only the company's products.

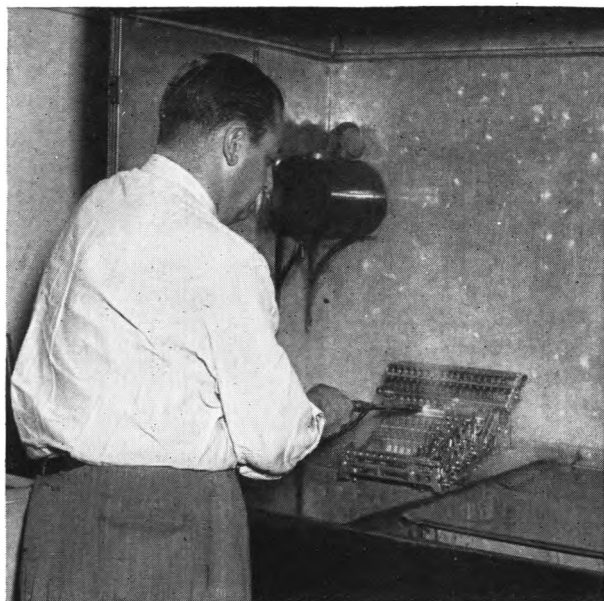
Servicemen working in independent shops must be able to repair all makes of calculators, and need a longer training period. Most calculator servicemen in independent shops receive no formal training, but learn through experience gained while helping experienced mechanics.

The main aptitudes needed by trainees are general mechanical ability and manual dexterity. The calculating machine manufacturers generally prefer to hire men in their early twenties.

### *Outlook*

Opportunities for new workers to enter this field will be good for 4 or 5 years. Expanded training programs are being conducted by the manufacturers and the need for skilled calculator servicemen in independent shops exceeds the supply. However, the number of new workers entering the occupation will be limited, since only about 2,400 men are engaged primarily in repairing calculators.





PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Cleaning a calculator with a fine spray of cleaning fluid—an important step in keeping the complicated mechanism in good running condition.

Looking further into the future, prospects are for an upward trend in the employment of servicemen, lasting for many years. There will be a growing demand for calculators in business and government. At the same time, there is a trend toward more complicated calculators, as they are improved and adapted to new uses.

Servicing of calculators is little affected by changes in general economic conditions. There are

few lay-offs during depressions as the tendency during poor years is to keep the old machines in repair rather than to buy new ones.

### *Earnings and Working Conditions*

In December 1947, typical earnings for a 40-hour week ranged from \$50 to \$85. Including commissions and overtime, earnings were often considerably higher. Commissions are sometimes paid to service mechanics on sales of contracts to do servicing for a particular firm.

Servicemen may be promoted to supervisory jobs. The weekly earnings of a service manager range up to \$120 and over—depending largely on the size of the shop. In manufacturers' service branches, mechanics are sometimes transferred to the sales departments.

Repairing calculators is usually light work and cleaner than most other mechanical trades. The occupation is relatively free from serious accidents. Generally, servicemen dress like office workers, since most service work is performed in the offices where the machines are located.

### *Where To Find Additional Information*

U. S. Department of Labor, Bureau of Labor Statistics; Employment Outlook for Business Machine Servicemen. Bulletin No. 892. Washington: U. S. Government Printing Office, 1947. Price 15 cents.

*See also* Adding Machine Servicemen, page 217.

## Cash Register Servicemen

(D.O.T. 5-83.124)

### *Outlook Summary*

During the next 4 or 5 years, a limited number of new workers will be able to enter this field. The long-run outlook is for steady employment.

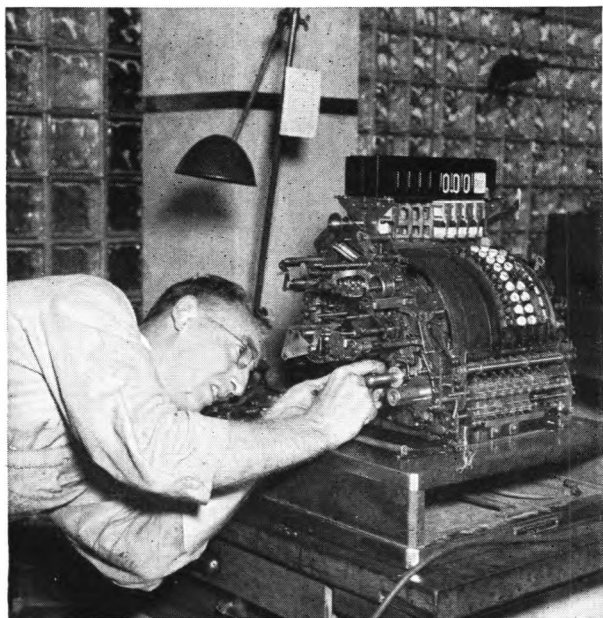
### *Nature of Work*

Cash-register servicemen inspect, adjust, and repair cash registers. Next to typewriters, cash registers are the most widely used business machines. They are found mainly in retail stores and service establishments. Cash registers vary greatly in the number of things they can do. The

simple models merely record each transaction, total the day's receipts, and provide a change drawer. The more complicated cash registers tabulate several different kinds of information on one transaction simultaneously, such as identification of clerk, department, and type of merchandise, as well as provide printed receipts with such information for the customer. The more elaborate cash registers actually perform many functions of accounting machines.

In some cases servicemen work on other types of business machines, such as adding machines or

accounting machines. Most repairs and adjustments are made in the establishments where the machines are used. Usually only major repair jobs are taken to the shop. Repairing cash registers involves determining the cause of trouble in the machines, replacing worn or broken parts, and cleaning and oiling machines. Servicemen use common hand tools, such as screw drivers, pliers, and punches, and special hand tools designed for cash registers.



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Cash-register repair is exacting work

### *Where Employed*

Cash register servicemen are employed principally in large cities. However, most cities of 50,000 population and over have shops repairing cash registers. The great majority of servicemen primarily engaged in repairing cash registers are employed in the local service branches of the few manufacturing firms in this field. There is little transferring of servicemen among firms. Some of the repair work, especially in smaller towns, is done in independently owned local shops, with only a few employees, which repair other types of business machines, such as typewriters and adding machines.

### *Training and Qualifications*

The training period for cash register mechanics employed in the manufacturers' service branches generally consists of 1 year of on-the-job training followed by about 6 months at the company school. Cash register servicemen working in manufacturers' shops are trained to repair only the company's own line of machines.

Servicemen working in independent repair shops generally have not had formal training, unless they are former employees of manufacturers' service branches. Most of the men in the independent shops pick up the trade while working as helpers in the shops. In independent shops, servicemen are required to repair several different makes of cash registers, and several years of this informal training is required.

New men entering the field should have general mechanical ability and enjoy working with machines. Since servicemen in this field make many contacts with customers, a presentable appearance and manner are important, and servicemen must be able to carry on some business transactions. Manufacturers generally prefer to hire as trainees high school graduates in their early twenties.

### *Outlook*

During the next 4 or 5 years, prospects will be good for new workers to enter the field in limited numbers. There will probably be more cash registers in use than ever before, since retail trade is expected to expand. Cash-register manufacturers are carrying on expanded-training programs, and are planning to open up many new service branches in the next few years. The number of men who can enter in any one year, however, is limited by the small size of the occupation. At the present time there are probably not more than 2,700 cash-register repairmen in the United States.

Longer-run prospects are for an upward trend in the employment of servicemen. Gradually increasing sales of new machines and the trend toward more complicated machines, which can do a wider variety of operations make it necessary for the manufacturers to build up larger service organizations.

This work is not greatly affected by changes in general economic conditions. In time of depression there are few lay-offs. Cash registers are

great timesavers and they serve so many essential commercial purposes that they are a necessity in most businesses. Depressions affect the sales of new machines, but the repair and service work continues.

#### *Earnings and Working Conditions*

In 1947, experienced cash-register servicemen typically earned from \$60 to \$75 a week, plus over-time for work beyond 40 hours. It generally takes a trainee 3 years to reach this level of earnings. Earnings may be increased through promotions to service supervisory jobs. Men showing sales talents are sometimes transferred to the sales department.

Repairing cash registers is comparatively free from the danger of accident and is cleaner than most other mechanical trades. Since most service work is performed in the offices or stores where the machines are located, servicemen generally dress like white-collar workers.

#### *Where To Get Additional Information*

U. S. Department of Labor, Bureau of Labor Statistics, *Employment Outlook for Business Machine Servicemen*. Bulletin No. 892. Washington: U. S. Government Printing Office, 1947. Price 15 cents.

## Accounting-Statistical Machine Servicemen

(D.O.T. 5-83.126)

#### *Outlook Summary*

A small number of new workers will be hired for trainee jobs during the next 3 or 4 years. The long-run outlook is for a gradual upward trend in the number of servicemen.

#### *Nature of Work*

These servicemen inspect, adjust, and repair punched-card accounting-statistical machines, such as card-punching, sorting, and tabulating machines, collators, multipliers and dividers, and verifiers. They also install machines in offices where they are used and sometimes train personnel to operate them. Accounting-statistical machines are machines designed to record and tabulate large masses of accounting and statistical data. The information is punched on cards alphabetically or according to a code, and the cards are put into machines which sort them and tabulate the results. These machines are used mainly in large organizations, such as Government agencies, department stores, insurance companies, and large industrial establishments for pay-roll and other accounting records, inventory control, statistical surveys, and similar purposes.

Repair work involves determining the cause of trouble in the machines, replacing worn or broken parts, and cleaning and oiling machines. Service-

men use common hand tools such as screw drivers, wrenches, punches, and pliers, and a few hand tools which are specially made for these machines. Repairs and adjustments are usually made in the establishments where the machines are used.

#### *Where Employed*

Accounting-statistical-machine servicemen are employed by two firms which manufacture and service all accounting-statistical machines. These men may be assigned by their companies to work anywhere in the United States, but usually their work is in large cities. They rarely transfer from one company to the other.

#### *Training and Qualifications*

Men seeking employment in this field should have general mechanical ability and enjoy working with machinery. Both concerns employing these servicemen generally require that new trainees be in their early twenties and have at least a high-school education. In addition, 2 years' technical schooling in electrical or mechanical engineering or equivalent electrical or mechanical experience is required.

Men hired as trainees are first given a trial period of 1 or 2 months' on-the-job training. If the new trainees are satisfactory, they are sent to the company school for a period of from 3 to 6

months. After completion of the school course they are put to work under supervision until they are able to service and repair machines on their own. This last period of training usually lasts from about 12 to 18 months.

### *Outlook*

For many years in the future there will be continued growth in the use of punched-card accounting-statistical machines. This growth, together with the need for replacing those who leave this work, means that prospects should be favorable for entering the occupation and remaining employed in it for many years. The number of men that will be hired in any one year will be limited, however, by the small size of the occupation—there are about 2,600 punched-card accounting-statistical-machine servicemen employed at the present time—and by the fact that increases in use of the machines will be gradual rather than sharp.

During the next 3 or 4 years prospects should be especially favorable for new workers to enter the occupation, as manufacturers are expanding their service organizations, to take care of the increasing number of machines in use.

Employment in this field will be steady, because this work is little affected by changes in general business conditions and because the policy of the companies in this field is to hold on to their serv-

icemen even when work is slack. In the past, there have been few lay-offs in time of depression.

### *Earnings and Working Conditions*

The earnings of servicemen vary considerably. Typical weekly straight-time earnings for accounting-statistical-machine servicemen with at least 3 years' experience ranged from about \$65 to \$85 at the end of 1947. However, a few of the most skilled servicemen earned up to \$100 a week. Periodic pay increases are given to servicemen according to skill and experience. Servicemen may be promoted to supervisory jobs, or may get into the sales departments.

Servicing and repairing these machines is cleaner and lighter work than most other mechanical trades. The occupation is comparatively free from the danger of accident. Servicemen generally dress like office workers, since the work is clean and is usually performed in the offices where the machines are used.

### *Where To Get Additional Information*

U. S. Department of Labor, Bureau of Labor Statistics, Employment Outlook for Business Machine Servicemen. Bulletin No. 892. Washington: U. S. Government Printing Office, 1947. Price 15 cents.

*See also* Adding Machine Servicemen, page 217; Calculating Machine Servicemen, page 218; and Cash Register Servicemen, page 219.

## **Accounting-Bookkeeping Machine Servicemen**

(D.O.T. 5-83.121)

### *Outlook Summary*

Opportunities will be good for a limited number of men with experience in repairing adding machines, calculators, and cash registers; there will be few opportunities for men without this experience. For those successful in entering the field, prospects are for steady employment.

### *Nature of work*

These servicemen inspect, adjust, and repair accounting-bookkeeping machines. There are a number of different types of these machines—some

post entries, some do billing, while others are combination typewriters and computing devices. All types have keyboards, like typewriters and adding machines. These machines are used wherever a great deal of accounting and bookkeeping is done, such as in department stores, large retail and wholesale businesses, and banks. Since there are several different types of machines, each complicated, the servicing is highly skilled work. Servicing these machines is sometimes combined with the servicing of other office machines.

Repair work involves determining the cause of trouble in the machines, replacing worn or broken

parts, and cleaning and oiling machines. Servicemen use common hand tools such as wrenches, punches, pliers, screw drivers, and a few hand tools which are specially designed for the particular type of machine being repaired. Adjustments and minor repairs are made in the offices where the machines are used. However, some major repair work is taken to the shop.



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Repairing accounting-bookkeeping machines is one of the most highly paid of business-machine servicing jobs

### *Where Employed*

These servicemen are employed principally in large cities, since this is where the bulk of the machines are used. Most accounting-bookkeeping machine mechanics are employed in the local service branches of companies which manufacture this equipment. There is little transferring of servicemen among the five main companies in this field. Only a very few servicemen are in independent repair shops.

### *Training and Qualifications*

Training programs for accounting-bookkeeping machine repairmen vary greatly among the companies employing these workers, partly because this work is frequently combined with the repair of other business machines. One large concern uses its mechanics primarily on the accounting-bookkeeping machines and does not combine this

work with other repair work. Two other major companies train their mechanics to work on all of the office machines that they manufacture. One of these firms has a 4- to 5-year training program.

Usually a man must have had 1 or 2 years' experience as an adding machine, calculator, or cash register repairman in order to be eligible for accounting-bookkeeping machine training—which consists of 2 or 3 years of on-the-job instruction and, in some cases, an additional 6 months of training at a company school. Some of the repair work on accounting-bookkeeping machines requires considerable experience and knowledge of the machines. Servicemen who have just completed their training need additional experience before they are qualified to perform all repair work.

The main aptitudes needed by a trainee are general mechanical ability and manual dexterity. Most manufacturers of these machines prefer to hire men in their early twenties as trainees. Since servicemen in this field make many contacts with customers, a presentable appearance and manner is important to the employers.

### *Outlook*

During the next 5 or 6 years, prospects will be good for a limited number of new men to enter this field. Additional workers will be trained in order to service the growing number of accounting-bookkeeping machines in use. However, most of the trainees will be drawn from the ranks of mechanics repairing other business machines, such as calculators. The accounting-bookkeeping machine manufacturers make other machines, such as adding machines, calculators, and cash registers, and the practice has developed of transferring some of the more skillful mechanics on these less complex machines to servicing the more intricate bookkeeping machines.

Although this field is small, comprising about 1,600 workers, it will probably expand gradually for several years to come. The trend is not only toward greater sales of these machines, but also toward greater complexity in newly developed equipment, which tends to increase the need for servicemen.

Long-run prospects are excellent for stable employment for those already in the trade or for those entering in the next few years, since this

occupation is little affected by declines in general business activity. The tendency during poor business years is to keep old machines in repair rather than to buy new ones.

#### *Earnings and Working Conditions*

In 1947, experienced servicemen typically earned from \$60 to \$85 for a 40-hour week, with some working 8 hours longer and receiving overtime pay. It generally takes a trainee about 3 years to reach this level of earnings. Experienced servicemen may be promoted to supervisory jobs. Men showing sales aptitude are sometimes transferred to the sales departments.

Repairing these machines is comparatively free

from the danger of accident and is cleaner than most other mechanical trades. Since most work is performed in the offices where the machines are located, servicemen generally dress like office workers.

#### *Where To Find Additional Information*

U. S. Department of Labor, Bureau of Labor Statistics, Employment Outlook for Business Machine Servicemen. Bulletin No. 892. Washington: U. S. Government Printing Office, 1947. Price 15 cents.

*See also:* Cash Register Servicemen, page 219; Calculating Machine Servicemen, page 218; and Adding Machine Servicemen, page 217.

## Gunsmiths

(D.O.T. 5-83.542)

#### *Outlook Summary*

There will be a small number of job openings for highly skilled workers; also some demand for less-skilled workers to do gun repairing in general locksmith and repair shops.

#### *Nature of Work*

The gunsmith rebuilds, repairs, and alters firearms, usually as the proprietor of a small shop. His duties include the repair of broken and worn-out parts and making new parts, frequently involving the use of such machine tools as the lathe and grinding machine, as well as many types of hand and woodworking tools. In addition some gunsmiths design and make new guns requiring a high degree of skill.

Gunsmithing is carried on by two main kinds of workers in two types of shops: (1) The combination locksmith and gun-repair shop operated by a mechanic who does general repair work on mechanical equipment and guns. The gun-repair work of this type of shop is primarily seasonal. (2) The shop operated by an expert craftsman who works on guns throughout the year and who specializes in intricate jobs, very often working on unusual and expensive arms.

Qualifications for doing this work in a locksmith and gun-repair shop are general mechanical

aptitude, and actual experience which can be best acquired by starting as a helper in a repair shop. The specialized gunsmith, the other type of worker, usually receives his training by spending much time rebuilding and repairing rifles and guns. He frequently gets started in the craft by tinkering with his own guns and if he has sufficient mechanical ability and interest in this hobby, he goes on to acquire a greater knowledge of gun repair and machine-shop practice. Some men have been able to establish themselves in the trade by doing repair jobs on a small scale among their acquaintances and acquiring a reputation for doing good work.

The more specialized gunsmith who spends most of his time designing and making new guns must have all-round skill. In designing new guns he may have to lay out the plan on paper, apply mathematical calculations, and do precision machining and wood shaping.

Gunsmiths are found throughout the country, to a large extent in the rural areas in which hunting is important. They are especially numerous in the Middle West and West. Most locksmith and repair shops are located in cities and the larger towns.

#### *Outlook*

During the next few years and also over the longer run there will be some opportunities for

highly skilled workers, mostly as replacements for those who leave the occupation due to death and retirement. Numbers of persons who used small arms while in the service will become increasingly interested in firearms, both for sport and as relics. As a result, a slight increase in job opportunities

is anticipated. There will be a moderate number of openings for gunsmiths in the locksmith and general repair shops. Despite the possibility of some growth, the size of the occupation will continue to be very small.

## Shoe Repairmen

(D.O.T. 4-60.100)

### *Outlook Summary*

The trade can use only a few additional workers in the next several years. Over the longer run the present employment level—considerably above prewar—will be maintained, with very little change.

### *Nature of Work*

The shoe repairman resoles and reheels shoes and performs various other repair jobs. To resole a shoe, he first rips off the old sole with a pair of nippers and levels and sands the welt (narrow strip of leather between the shoe upper and the sole). Next, the new sole is set in place over the welt and permanently attached either by cementing, nailing, or machine stitching. Then the edges of the new sole are held against a revolving trimmer until the sole is trimmed to the shape of the shoe. Finally, the bottom of the sole is buffed, and the edges and bottom are waxed and stained to give a finished appearance. In reheeling, the old heel must be snapped off, and a new one shaped (by hand or machine) and fastened into place. The new heel is buffed and finished in the same manner as new soles. Numerous other shoe-repair services, such as cleaning, dyeing, and stretching, stitching ripped seams, patching holes, attaching heel and toe plates, and replacing buttons and buckles, are a part of the everyday work of the shoe repairman.

Over three-fourths of the shoe repairmen (about 60,000 working in 1940) own or operate their own shops. Most of the shops are small one-man businesses and the owner-repairman is an all-round workman capable of handling almost any repair job. Comparatively few of the 50,000 shops throughout the country in 1939 had more than one qualified repairman. One-man shops frequently

have a bootblack or worker to do odd jobs, but such employees rarely achieve the status of shoe repairman. In large shoe-repair shops located in downtown sections of cities, skilled craftsmen are often specialists. Some, for instance, work only on men's shoes or women's shoes, others specialize in machine operations or bench (hand) work, and partially trained workers may perform the simple tasks.

### *How To Get Into the Trade*

The most common method of entering this trade is by serving an apprenticeship (usually 2 years) under an experienced shoe repairman. However, many shoe repairmen pick up the trade by getting a minor job in one of the large shops and advancing from the least difficult to the most difficult operations. Less emphasis is placed upon apprenticeship in large shops, where beginners are often hired and trained in a few months for one particular operation—such as finishing—which they continue to do.

### *Outlook*

Prospects for additional skilled repairmen are not very bright despite the fact that those in the trade expect to retain at least 50 percent of the wartime increase in business. During the war there was an unprecedented demand for shoe repairers. At the same time many skilled men were lost to the armed forces. As a result of the efforts to fill wartime needs there is currently a sizable number of partially trained workers. The majority will remain in the trade and eventually become skilled repairmen. A good many will doubtless want to go into business for themselves. Consequently, opportunities for additional workers to

obtain training and experience in shoe repairing will be limited for the next few years.

Prospects for continuing employment are good for those who learn the trade. The demand for shoe repairs is fairly steady and goes on very much the same year after year. Few shoe repair businesses fail, even in periods of depression.

Jobs are located throughout the country, in small cities as well as large. Employment opportunities are better in the Middle Atlantic and East North Central States where over one-half of the shoe repair shops are located. Barring excessive competition, shoe repairmen usually fare better in cities because the average expenditures per

family for shoe repairs are much larger than in small towns and rural areas.

### *Earnings*

In prewar years workers in shoe repair shops were not highly paid. Wages of skilled men ranged from \$25 to \$35 a week. Wages have risen to the point where skilled workmen in city shops now receive from \$55 to \$80 a week and semiskilled finishers from \$35 to \$45. Hours of work are often long. Employment in shoe repairing is fairly steady throughout the year with the busiest seasons occurring in early spring and fall.

## Watch Repairmen

(D.O.T. 4-71.510)

### *Outlook Summary*

Good employment outlook for skilled men both in near future and in long run. Good current opportunities for men watchmaker-school graduates but competition for junior jobs likely to become keen within next few years. Long-run employment trend slowly upward.

### *Nature of Work*

Watch repairmen (who are frequently referred to as "watchmakers") repair and adjust timepieces. This involves a variety of duties such as inserting new springs, refitting pivots, truing balance wheels, and grinding old parts or making new parts. These workers also clean and oil the parts, refinish dials, and repair or replace wristbands. In small shops, watch repairmen may perform some of the simpler types of jewelry repair and sometimes sell jewelry and watches. It is customary to specialize in either watch or clock repair work. The latter generally requires less skill than the former.

### *Where Employed*

Watchmakers work in retail jewelry stores, department stores, mail-order houses, "trade shops" which service retail stores, repair departments of watch and clock factories, and importing firms. Many of these in retail stores and trade shops are in business for themselves.

Jobs are to be found in all parts of the country, but are concentrated in large cities, particularly New York which, in addition to other types of shops, has most of the importing firms. Some employment and business opportunities, however, will be found in smaller cities, in some of which there are fewer watchmakers relative to demand than in large cities.

### *Qualifications*

Watch repairing is extremely intricate and precise work and requires much patience as well as a high degree of mechanical aptitude. A veteran who has had instrument repair experience has usually developed a partial skill of small-tool manipulation and would probably make a good watch technician provided he received further training.

Anyone wishing to enter the watchmaking trade will find that 1 or 2 years in a watchmaker's training school is desirable; without such training it will generally be difficult to qualify later as a highly skilled watchmaker. The best watchmakers' schools provide thorough training in all phases of the trade, though their graduates need months of experience and practice on the job to reach a high rate of output. Men trained at lower-grade schools may need 3 to 5 years of work experience to become highly skilled. Some employers take on men with less than a year's training in



a school or with no school background at all and attempt to train them on the job, but watchmakers are usually too busy now to give beginners adequate attention. Only a small number of shops have formal apprenticeship programs. Such programs and also most jobs for recent school graduates and other partially qualified men are in larger shops where there is more specialization. Small shops, particularly in large cities, generally hire only skilled men.

Certificates, which are widely recognized by employers throughout the country, are issued by the Horological Institute of America to those who are able to pass the Institute's examinations and thus demonstrate a certain quality of workmanship. Junior watchmaker certificates are granted to those able to pass a relatively simple examination, usually men who have completed school or the equivalent in on-the-job training. Certified watchmaker certificates are awarded to men who pass the more difficult examination, usually men who have had about five or more years' experience. Certificates of proficiency are also issued by the Testing and Certification Laboratory of the United Horological Association of America. However, the States which require licenses—namely, Wisconsin, Indiana, Iowa, Minnesota, Oregon, and Oklahoma—will not accept the certificates of either organization in lieu of their own examinations.

### *Outlook*

There is a shortage of skilled workers at the present time; also good opportunities for watchmaker-school graduates. Employment in the occupation was about 15,000 to 20,000 before the war and is now somewhat higher. Junior watchmakers who have completed a school course or equivalent on-the-job training are entering the field at the rate of about 5,000 to 6,000 a year. Nevertheless, more watches are being brought in for repair than can be taken care of. This is due largely to the interruption of production of new watches and clocks caused by conversion of the industry to war production. While there is an oversupply of job applicants without adequate basic training, many

shops refuse to employ them because they are likely to damage the watches.

The shortage of skilled workers, though acute, is declining and will be relieved, according to one estimate, in 3 to 6 years. The watchmakers' schools have expanded enrollments and the better ones have waiting lists, although these waiting lists are declining. When the boom in veterans' training has subsided, enrollments are likely to drop off, but they may not drop soon enough to avoid a surplus of new graduates. The number of watches and clocks brought in for repair is likely to diminish as worn-out timepieces are replaced by new ones, since the watch and clock industry is producing at peak levels. Watchmakers with inadequate training will be in danger of being displaced, and even well-trained junior men may have difficulty getting jobs.

The long-run trend in employment is slowly upward, because of the rising trend in watch and clock ownership. Retirement of older watchmakers is a factor in creating employment opportunities. This trade is less affected by declines in business activity than many other fields. A top-notch man (skilled enough to make his own parts) is likely to have employment in good times and bad.

### *Earnings*

In early 1948, experienced watchmakers typically made around \$100 a week, according to one estimate. Earnings of self-employed watchmakers vary considerably, depending not only upon the individual's skill but also upon the number of men working for him and, in the case of retail jewelry stores, upon the quantity of stock and volume of sales. Work and earnings are fairly steady throughout the year.

### *Where To Go for Additional Information*

Horological Institute of America,  
National Bureau of Standards,  
Washington, D. C.

United Horological Association of America,  
1549 Lawrence Street,  
Denver 2, Colo.

*See also:* Watch and Clock Factory Workers, page 370.

## Jewelry Repairmen

(D.O.T. 4-71.010 and .020)

### *Outlook Summary*

A few scattered job openings for top-skilled men, but trade overcrowded with partially trained workers and trainees. Chances for newcomers therefore poor, at least for next few years. Not much expansion in employment expected in long run. Trade likely to be very much affected by any decline in general business activity.

### *Nature of Work*

These workers repair and reshape jewelry such as rings, pins, chains, earrings, bracelets, clasps, religious jewelry, necklaces, and other ornaments. In smaller shops they may also set stones or design and make pieces of jewelry. Occasionally, the repairmen do hand engraving on jewelry and silverware or handle very minor watch repairs.

### *Where Employed*

Jewelry repairmen work chiefly in retail jewelry stores; but also in repair departments of jewelry factories and of department stores, and in trade shops which do work for retail stores. Most shops or repair departments are small, employing only a handful of men. In retail stores, repairmen sometimes assist in selling jewelry and watches. A good many repairmen eventually acquire their own trade shops or retail jewelry stores.

### *How To Enter*

It takes 2 to 3 years of on-the-job experience and training in the trade to become qualified to handle most repair jobs; several years more to become a highly skilled, all-round jeweler. Only a small number of shops—generally the larger ones—have apprenticeship systems; except in these shops there are few opportunities to get well-rounded training. There are in some cities public and private vocational schools which offer courses in jewelry repair and design, stone setting, and engraving. Additional practical experience is necessary after completing a school course, in order to become a skilled worker.

Since this is light sedentary work, it is suitable for people with certain types of physical handicaps. Many disabled veterans have been successfully employed in this field.

This is a small occupation, employing only a few thousand men. The supply of skilled repairmen is about adequate for present needs, although there are a few scattered job openings. The labor shortage which developed during and immediately after the war, has now disappeared. Many former workers have returned to the trade from war industries and the armed services. In addition, jewelry sales, after reaching a peak in the spring of 1946, have since been showing a slight decline, especially in the higher priced lines, thereby lessening the need for skilled men. Partially trained men, with whom the trade is oversupplied, are in a much more unfavorable position. Now that the need for workers is not so acute, these men are finding it harder to get jobs. Trainee openings will also be scarce for the next few years owing both to the surplus of semiskilled workers and to the fact that more men than usual have been taken on as trainees since the end of the war. What few openings for beginners and partially skilled workers do occur in the next few years will generally be found in the larger trade shops and department store service departments. Retail jewelry stores, who rarely employ more than one or two men, require skilled workers.

A few highly skilled and experienced men may be able to open their own retail stores or trade shops, especially in medium-sized communities which do not now have such services. Retail stores, which carry watch and jewelry stock, require at least \$5,000 capital to start in a modest way; stores in a better location or having more stock are likely to need between \$10,000 and \$15,000 as a minimum. For a trade shop, several thousand dollars would be needed for materials and machinery.

Little if any increase over present employment levels is expected in the long run. Openings that

arise will be primarily due to turn-over, and these will be few in number since turn-over is characteristically slight in this occupation. Furthermore, since this is a luxury trade, it is greatly affected by declines in general business activity. In bad times, repair business tends to be somewhat more stable than jewelry making; people who can afford any expenditure in this field are likely to have their old jewelry repaired rather than buy new pieces.

What jobs are to be found will be scattered throughout the country. The majority are in the larger cities. However, some employment and business opportunities, especially for skilled men, will be found in smaller cities, where earnings may not be as high but there is often much less competition for jobs.

### *Earnings*

Weekly earnings of skilled men, according to scattered reports, ranged from \$65 to \$160 in late 1947. Those in business for themselves may earn somewhat more. Earnings are greatest before and immediately after Christmas. Overtime is very

common. The months when there is the least work are those in the late winter and early spring.

### *Where To Go for More Information*

Additional information on job opportunities, training, earnings, and related matters may be obtained from the following organizations:

International Jewelry Workers Union, AFL,  
Suite 825, 551 5th Ave.,  
New York 17, N. Y.

Jewelry Industry Council,  
366 5th Ave.,  
New York 1, N. Y.

Playthings, Jewelry, and Novelty Workers International Union, CIO,  
225 Lafayette St., Room 606,  
New York 12, N. Y.

The following pamphlet contains information helpful to those interested in going into business for themselves:

U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce. Establishing and Operating a Jewelry Store. Industrial (Small Business) Series No. 55. U. S. Government Printing Office; Washington, D. C., 1947. Price 15 cents.

# Machine Shop Occupations

Machine-shop workers are the largest occupational group in metalworking and one of the most important groups in all industry. Currently, about 850,000 workers are employed in the skilled and semiskilled machining occupations. In addition, there are many thousands of other workers, such as inspectors, helpers, and laborers employed in machine shops.

## *Nature of Machine Shop Work*

Metal is cut down to shape in machine shops by machine tools—power-driven machines which firmly hold both the piece of metal to be shaped

and a cutting instrument, or tool, and bring them together so that the metal is cut, shaved, ground, or drilled. In some, the tool is moved and the metal held stationary; in others, the metal is moved against a stationary tool.

The most common kinds of machine tools include the engine lathe, turret lathe, grinding machine, boring mill, drilling machine, milling machine, screw machine, shaper, and planer. The operation of lathes is known as turning. The piece of metal being cut is rotated against the cutting tool held in the machine. A screw machine is a type of lathe. Boring mills and drilling machines are

General view of a small machine shop.

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among the machines that make holes in metal. Grinding machines remove metal with a power-driven abrasive wheel. Milling machines shape metal with a saw-toothed cutting tool. Planers and shapers are used to machine flat surfaces.

Some machine shops manufacture metal products and others do maintenance work—making or repairing metal parts for machinery or equipment in use. The manufacturing shops are of two main types—job shops and production shops—depending upon the way their production is organized. In job shops, the earliest developed, a wide variety of products may be made, with relatively few of each kind. Production shops, on the other hand, make large quantities of identical parts.

#### *Industries Where Employed*

Machine-shop workers are employed principally in the metalworking industries. Nearly every industry, however, employs some machine-shop workers in maintenance work. About four-fifths of all workers in the machine-shop occupations have jobs in metal industries like machinery, automobiles, and iron and steel (see chart 35).

Most of the remaining machine-shop workers are

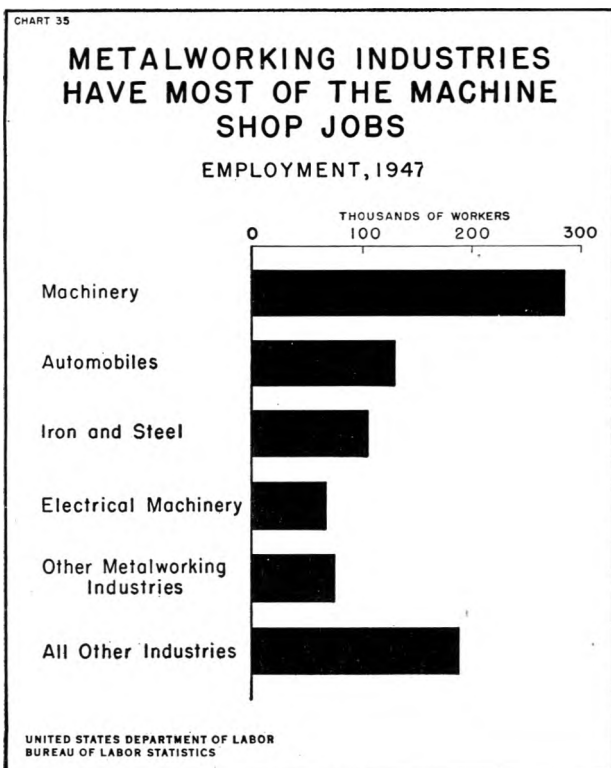
found in the maintenance shops of a large number of nonmetalworking industries, including, for example, railroads, public utilities, and plants making such products as cotton textiles, paper, cigarettes, chemicals, and food. Even though the number of machine-shop workers in most non-metal industries is small, these industries, taken together, are important as a source of employment for machine-shop workers since they provide almost one-fifth of the jobs for them. Moreover, in many cases the machine-shop jobs rate among the better job opportunities in the plant and its locality, as for example, in many textile mills in southern towns.

#### *General Employment Outlook*

Prospects are for a moderate rise in the number of machine-shop jobs during the next several years. Continued high employment levels are anticipated in many of the metal-working industries, which are the main source of machine-shop jobs. Some of these industries are likely to hire considerable numbers of additional workers for their machine shops. There will also be opportunities in the maintenance machine shops of a wide variety of nonmetal industries.

After a few years of high employment, the number of jobs in many metalworking industries will probably decline somewhat, after the backlog of demand for many metal products is worked off. However, in the long run, machine-shop employment should remain far above what it was before the war. The long-term trend in metalworking employment has been upward (chart 36). But one may also see in the chart that the industries using machine-shop workers are hit severely by depressions.

Even more than employment trends, replacement needs are likely to affect job opportunities in machine shops. A high proportion of machine-shop workers, especially the more skilled, are of advanced age and will have to be replaced in a relatively few years. Deaths and retirements may create from about 13,000 to 17,000 job openings annually. In addition, many new workers will be needed to replace the large numbers of less-skilled machine-shop workers who shift into other lines of work, or drop out of the labor market for one reason or another.





In many areas there will be relatively few apprentice openings for another year or two because of the large number of apprentices taken on since the end of the war. When these men have completed their training, however, apprentice openings should be fairly numerous.

All in all, there should be many openings for new workers in machine-shop jobs during the next few years. These workers will have favorable prospects for continued employment over a period of many years.

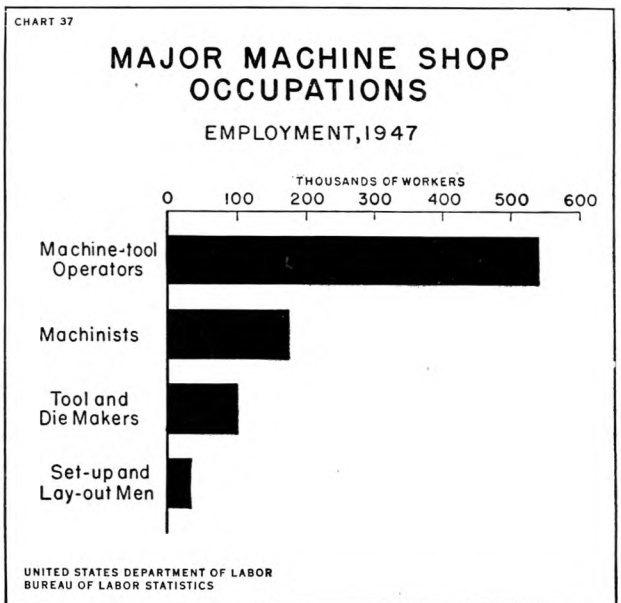
Even though the employment outlook for machine-shop workers is generally favorable, there are some differences in prospects among the various occupations. The outlook in some of the major machine-shop occupations is summarized in the following reports.

#### *The Major Occupations*

Major machine-shop occupations are shown in chart 37. The basic machine-shop job is that of the *all-round machinist*. Machinists are employed mainly where workers are needed who are qualified

to perform any of the operations in a machine shop rather than to work on only one type of machine.

*Tool and die makers* are essentially highly trained machinists who specialize on tool or die work. The function of tool makers is to make



cutting tools used on machine tools, jigs, and fixtures which hold the work while it is being machined, and gages and other precision measuring devices. Die makers construct the dies used in such metal-forming operations as forging, stamping, and pressing, and they also make the metal molds used in die-casting metal and molding plastics.

The specialized operators of machine tools make up the bulk of the workers in machine shops. These workers may be either relatively skilled men who can handle a variety of work on one type of machine, including the making of adjustments on the machine, or they may be less skilled operators whose duties are confined principally to placing the workpiece in the machine and watching its operation. Nearly 540,000 are employed as machine-tool operators.

In many production shops it is possible to use semiskilled machine-tool operators only because the most difficult parts of the work are done for them by set-up men and lay-out men. The *set-up man* is a skilled specialist employed in machine shops which carry on large-volume production. His job is to install cutting tools and adjust the

controls of machine tools so that they can be run by semiskilled operators.

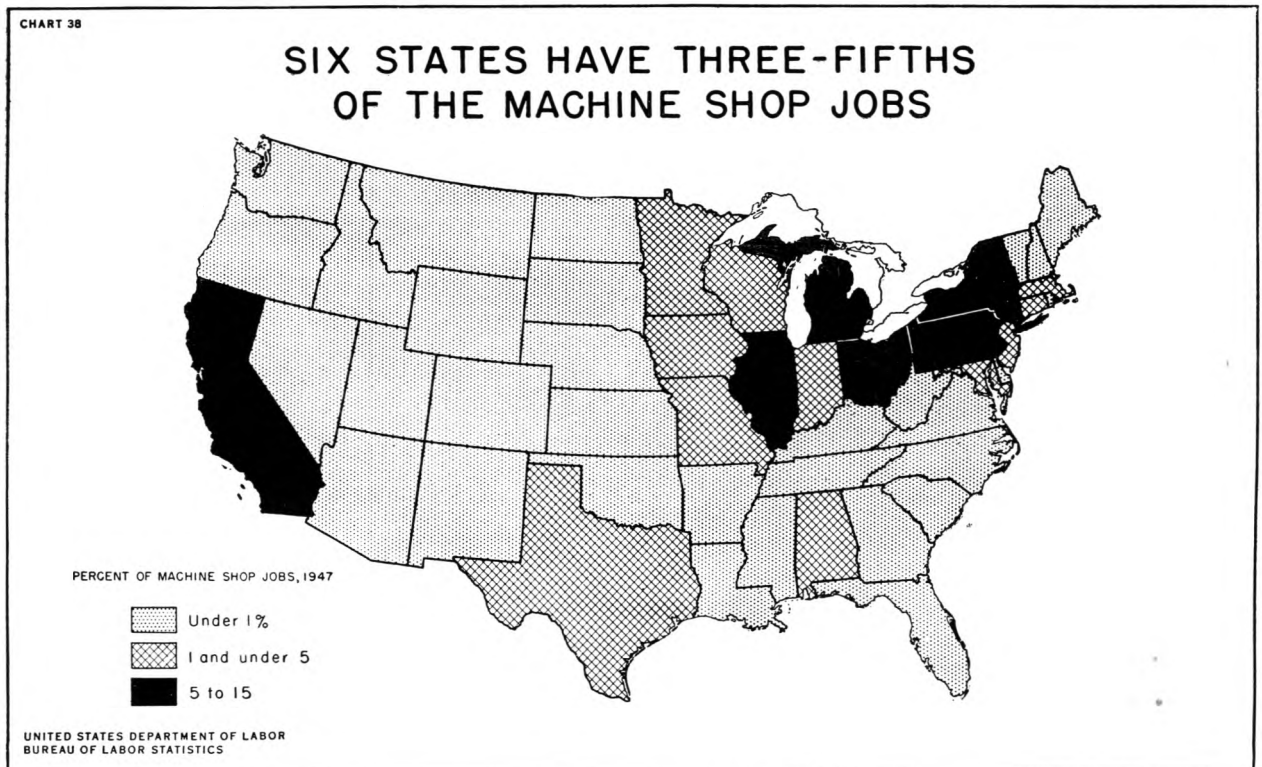
The *lay-out man* is a highly skilled specialist whose job is to make guide marks on metal before it is machined to indicate to the machine-tool operators the kind of machining needed. This is one of the smaller machine-shop occupations.

#### *Where Machine-Shop Jobs Are Found*

Because so many machine shops are in metal-working industries, the bulk of them are found in the northeastern and midwestern sections of the country, where these industries are concentrated. Some machine-shop employment, however, is scattered throughout the country in railroad repair shops and the maintenance shops of other industries. There are machine-shop jobs in every State, as is shown in chart 38.

#### *Where To Get Additional Information*

Employment Outlook in Machine-Shop Occupations. Bulletin No. 895. U. S. Bureau of Labor Statistics, 1947. 28 pp., 3 charts, 7 illus. Price, 20 cents. Superintendent of Documents, Washington, D. C.



## All-Round Machinists

(D.O.T. 4-75.010)

### *Outlook Summary*

Continued high employment of machinists is expected for the next several years. Currently, there are few apprentice openings, but after a year or two, there will probably be many new apprentices hired.

### *Nature of Work*

This is a skilled machine-shop occupation, in which about 175,000 men are employed. In addition, there are thousands of men with training as all-round machinists but employed in other machine-shop occupations, such as that of machine-tool operator.

Variety is the main feature of the all-round machinist's work. He knows how to work from blueprints and specifications, can select the tools and materials for each job, and can plan the sequence of machining operations. He is able to set up and operate such standard machine tools as lathes, planers, milling machines, grinders, shapers, boring mills, and drilling machines.

### *Where Employed*

The majority of all-round machinist jobs are in maintenance shops in industries which use machinery, such as railroads, textile mills, automobile factories, oil refineries, steel mills, and printing plants. Many all-round jobs are also found in manufacturing shops (including job and production shops) which make machinery and metal parts, such as machine tools, tractors, and railroad equipment. In job shops, a wide variety of products may be made, with relatively few of each kind. Production shops, on the other hand, make large quantities of identical parts. In general, work in job and maintenance shops requires greater all-round skill. In production shops, there are large numbers of men trained as all-round machinists, but not usually employed as such; these men specialize in a single machine-shop function, such as set-up or operation of one type of machine tool.

Most of the machinists' jobs are in the Middle

Western and Northeastern States where the metal-working industries are concentrated. However, machinists are employed in every State because of their use in maintenance work.

### *Training and Qualifications*

The machinist trade can be learned in two ways. According to most authorities, a 4-year apprenticeship is the best way, but, on the other hand, many have qualified without an apprenticeship, by picking up the trade over a number of years of varied shop experience.

An apprentice machinist must be mechanically inclined and temperamentally suited to very careful and exact work. Great physical strength is not required for this work. A high-school or trade-school education is desirable preparation for machinist training and some employers require such preparation. In general, this is a man's occupation.

### *Outlook*

The number of all-round machinist jobs during the next several years is expected to continue at about the present high level. However, there will be relatively few apprentice openings for a year or two, until the present large number of apprentices who are already enrolled have completed training.

Replacement needs will create many opportunities. There are many all-round machinists closely approaching the age when death or retirement will take them from their jobs. To provide for their replacement, over 40,000 new machinists must be trained during the next decade.

In manufacturing shops the number of jobs requiring all-round machinists to fill them may be expected to show a slight, gradual decline after the next several years, mainly because of technical changes which reduce the skill needed, permitting some substitution of less-trained men. Machinist training will continue, however, to offer considerable advantage. Machinists are generally preferred for specialized jobs, which often pay as well



or better than all-round jobs. Moreover, all-round machine-shop workers must continue to be hired in order to supply the necessary supervisory staffs. In maintenance shops, the increasing mechanization of industry may expand the need for maintenance machinists to keep production equipment in working order.



COURTESY OF NATIONAL ARCHIVES

The basic machine shop job is that of the all-round machinist, who can operate all standard types of machine tools.

### *Earnings and Working Conditions*

Although the pay of all-round machinists compares favorably with that of other machine-shop workers, it is often lower than the earnings of skilled machine-tool operators, many of whom work on an incentive basis. The earnings of machinists vary considerably among localities. The average straight-time hourly earnings of production machinists in machinery plants in November 1947 are shown here for selected large cities.

Atlanta	\$1.42	Milwaukee	\$1.42
Baltimore	1.47	Minneapolis-	
Birmingham	1.46	St. Paul	1.43
Boston	1.32	Newark-Jersey City	1.42
Buffalo	1.35	New York City	1.49
Charlotte	1.16	Philadelphia	1.45
Chattanooga	1.40	Pittsburgh	1.53
Chicago-Gary	1.58	Portland-Oregon	1.58
Cleveland	1.54	Providence	1.27
Dallas	1.36	St. Louis	1.65
Denver	1.34	San Francisco	1.67
Detroit	1.60	Seattle	1.67
Houston	1.49	Syracuse	1.48
Indianapolis	1.48	Tulsa	1.41
Los Angeles	1.54	Waterbury	1.38

The great majority of machinists are members of unions. There are a number of labor organizations in this field, some of the more important of which are the International Association of Machinists (Independent), the United Electrical, Radio and Machine Workers of America (CIO), the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO), the United Steelworkers of America (CIO), and the Mechanics Educational Society of America (Independent).

The promotional opportunities for all-round machinists are good. Many advance to foreman of a section in the shop, or to other supervisory jobs. With additional training, some develop into tool and die makers. Highly skilled and experienced machinists sometimes have the chance to start small machine shops of their own.

Most machine shops are relatively clean, well lighted, and free from dust. The danger of serious accidents in machine shops is comparatively small. Machine shops are generally safer places in which to work than are most factories.

*See also* Set-Up Men (Machine Shop), page 244; Lay-Out Men (Machine Shop), page 245; Tool and Die Makers, page 236; Engine-Lathe Operators, page 238; Turret-Lathe Operators, page 239; Grinding Machine Operators, page 241; Milling Machine Operators, page 242; and Shaper Operators, page 243.

## Tool and Die Makers

(D.O.T. 4-76.010, .040, and .210)

### *Outlook Summary*

Rising employment levels are expected for the next several years, but there will be few apprentice openings. Over the longer run, however, replacement needs will create many jobs for new workers.

### *Nature of Work*

Tool and die makers are essentially highly trained machinists who specialize on tool or die work. Theirs is the most skilled job in machine shops and is also one of the larger skilled fields in metalworking—nearly 100,000 are currently employed.

The function of tool makers is to make cutting tools used on machine tools, jigs, and fixtures (which hold the work while it is being machined), and gages and other precision measuring devices. Die makers construct the dies used in such metal forming operations as forging, stamping, and pressing and they also make the metal molds used in die-casting metal and molding plastics. Tool and die makers must have a broad knowledge of machine-shop work, including blueprint reading, laying out work, setting up and operating machine tools, and using precision-measuring instruments.

### *Training and Qualifications*

To learn this work requires rounded and varied machine-shop experience, usually obtained through formal apprenticeship or the equivalent in other types of on-the-job training. A tool and die apprenticeship ordinarily covers 4 or 5 years, including mainly shop training in various parts of the job. Since tool and die making is the most exacting type of machine-shop job, persons planning to enter the trade should have a great deal of mechanical ability and liking for painstaking work. This is essentially a man's job, although little physical strength is required.

### *Where Employed*

Although tool and die makers work in many different metalworking industries, the automobile

industry, with nearly one-third of the jobs, is the largest employer. Also very important are tool and die jobbing shops. Many are employed in other machinery industries, including electrical machinery and general industrial equipment. Among the nonmetal industries using these workers is the plastics products industry, which employs die makers to make metal molds.

Most of the tool and die maker employment is in the midwestern and northeastern sections of the country. Michigan, especially the Detroit area, has more jobs than any other section. Many are also employed in Ohio, Illinois, New York, and Pennsylvania.

### *Outlook*

Prospects are for several years of rising employment in this occupation. The biggest factor in the job outlook for tool and die makers is the expected large volume of automobile production. High output of automobiles will also tend to maintain employment in tool and die jobbing shops, many of which serve the automobile industry. Prospective Government programs for expanding production of military aircraft will also require additional tool and die makers. In many other industries—such as the heavy electrical equipment and farm machinery industries—production prospects are good. Moreover, tooling up for various new products will provide additional jobs.

Replacement needs are important, because many tool and die makers are approaching ages at which they are increasingly likely to drop out of the labor force because of death or retirement. During the next 10 years, such drop-outs may create upward of 20,000 new openings.

During the next year or two, there will be relatively few apprentice openings, because of the large number of apprentices taken on recently. However, after these men complete training, apprentice openings should be numerous.

After several years, the accumulated demand for many metal products will have been met, and the employment of tool and die makers will prob-

ably drop slightly from its high postwar level. However, large numbers of these workers will still be needed, not only to repair and replace the tools and dies normally used by industry, but also to retool plants for new products. It is reasonably certain that those who enter the trade during the



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

An apprentice tool and die maker learns how to operate standard machine tools, such as this shaper.

next several years will find good employment opportunities for many years to come. Even in the event of a general business depression, with machine-shop employment temporarily down, experienced tool and die makers, because of their all-round skills would have fairly good chances to get lower rated machine-shop jobs.

#### *Earnings and Working Conditions*

This is the highest paid machine-shop occupation. Earnings of tool and die makers vary considerably among localities. Average straight-time hourly earnings of tool and die makers

employed in machinery plants in November 1947 are shown below for selected large cities.

Atlanta.....	\$1. 45	Los Angeles.....	\$1. 72
Baltimore.....	1. 61	Milwaukee.....	1. 61
Birmingham.....	1. 55	Minneapolis-St. Paul..	1. 59
Boston.....	1. 46	Newark-Jersey City..	1. 68
Buffalo.....	1. 52	New York City.....	1. 75
Chattanooga.....	1. 55	Philadelphia.....	1. 71
Chicago-Gary.....	1. 78	Pittsburgh.....	1. 56
Cincinnati.....	1. 60	Portland, Oreg.....	1. 77
Cleveland.....	1. 77	Providence.....	1. 45
Dallas.....	1. 45	St. Louis.....	1. 87
Denver.....	1. 45	San Francisco.....	2. 00
Detroit.....	1. 83	Seattle.....	1. 91
Hartford.....	1. 58	Syracuse.....	1. 53
Houston.....	1. 69	Tulsa.....	1. 55
Indianapolis.....	1. 71	Waterbury.....	1. 57

Tool and die makers in machine-tool accessory plants in December 1947 had average straight-time hourly earnings of \$1.94 in Chicago, \$1.74 in Cleveland, \$2.10 in Detroit, and \$1.83 in Los Angeles.

The great majority of tool and die makers are members of unions. There are a number of labor organizations in this field, some of the more important of which are the International Association of Machinists (Independent), the United Electrical, Radio and Machine Workers of America (CIO), the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO), and the Society of Tool and Die Craftsmen of America (Independent).

Tool and die makers often rise to better jobs. Many have advanced to shop superintendent or other responsible supervisory work, or to such positions as tool designer. Another avenue of opportunity is the opening of small tool and die jobbing shops.

Tool rooms, where tool and die makers work, are relatively clean, well ventilated, and free from dust. They are considerably safer places to work than factories in general.

*See also All-Round Machinists, page 234.*

## Engine-Lathe Operators

(D. O. T. 14-78.000 to 4-78.019; 6-78.000 to 6-78.019)

### *Outlook Summary*

The number of these jobs should increase during the next several years; thereafter a slight drop in employment is likely, but new workers will be needed to replace many of the older men in the occupation.

### *Nature of Work*

These are machine-shop workers specializing in operating an engine lathe, a machine tool which shapes metal by rotating the metal against a cutting tool. These jobs may be divided into two main classes, according to the skill required. The skilled engine-lathe operator does varying kinds of machining. He works from blueprints or layouts, sets up his machine for each machining operation, and measures the finished work to see if it meets specifications. His work is much like that of the all-round machinist except that it is limited to the engine lathe. The semiskilled engine-lathe operator does repetitive work. Typically his job consists of placing the metal stock in the machine, watching the machining for signs of trouble, and measuring the finished work with specially prepared gages which simplify measurement. His machine is set up for him by a machinist or set-up man.

### *Training and Qualifications*

To become a skilled engine-lathe operator requires from 2 to 4 years of on-the-job training. However, many of these jobs are filled by men who have completed all-round machinist apprenticeships. Semiskilled engine-lathe operators are generally trained in not more than 6 months on the job.

The work is not physically strenuous and a number of women are employed as engine-lathe operators. Most of the women, however, are semiskilled operators.

### *Where Employed*

Engine-lathe operators are employed mainly in metalworking industries. Many of the skilled en-

gine-lathe operators work in jobbing machine shops, a few are in maintenance shops of non-metal industries. Production shops in mass-production industries, such as automobiles, employ most of the semiskilled engine-lathe operators. In the job shops a wide variety of products may be made with relatively few of each kind. Production shops make large quantities of identical parts, and skill requirements are generally lower than in job shops.

Most of the jobs for engine-lathe operators are in the middle-western and northeastern sections of the United States, with Michigan, Ohio, New York, and Pennsylvania the leading States.

### *Outlook*

Prospects are for a slight increase in the number of jobs for engine-lathe operators during the next several years, because of the expected high output of many metal products, including automobiles, aircraft, farm machinery, and heavy electrical equipment. In general, skilled operators will be more in demand than the semiskilled. After a few years, employment of engine-lathe operators may drop slightly as production in the metalworking industries catches up with unsatisfied demand. The number of jobs for engine-lathe operators should continue, however, at a relatively high level. Many of the skilled engine-lathe operators are older men, approaching the ages when death or retirement will take them from the shops. Replacement of these workers will result in numerous openings. Among the semiskilled operators, shifting into other occupations is fairly common, and openings for new workers will be created in this way.

### *Earnings and Working Conditions*

Many engine-lathe operators are paid on an incentive basis and hence often earn as much as machine-shop workers of greater skill. Earnings of these workers vary considerably among localities. Average straight-time hourly earnings of male engine-lathe operators in machinery plants

in November 1947 are shown below for selected large cities.

	Class A	Class B	Class C
Atlanta.....	\$1. 34	\$1. 18	\$0. 86
Baltimore.....	1. 34	1. 11	. 92
Birmingham.....	1. 49	1. 26	-----
Boston.....	1. 46	1. 24	1. 09
Buffalo.....	1. 43	1. 20	. 86
Charlotte.....	1. 19	. 99	. 84
Chattanooga.....	1. 44	1. 31	-----
Chicago-Gary.....	1. 54	1. 42	1. 37
Cincinnati.....	1. 32	1. 14	1. 05
Cleveland.....	1. 66	1. 71	1. 20
Dallas.....	1. 49	1. 20	-----
Denver.....	1. 31	1. 07	-----
Detroit.....	1. 67	1. 50	-----
Hartford.....	1. 72	1. 33	-----
Houston.....	1. 56	1. 32	1. 22
Indianapolis.....	1. 44	1. 34	1. 19
Los Angeles.....	1. 56	1. 42	1. 26
Milwaukee.....	1. 54	1. 47	1. 24
Minneapolis-St. Paul.....	1. 44	1. 30	-----
Newark-Jersey City.....	1. 61	1. 32	1. 27
New York City.....	1. 57	1. 37	1. 07
Philadelphia.....	1. 61	1. 33	1. 14
Pittsburgh.....	1. 50	1. 35	1. 40
Portland, Oreg.....	1. 55	-----	-----
Providence.....	1. 23	1. 08	. 91
St. Louis.....	1. 55	1. 35	-----
San Francisco.....	1. 71	1. 44	-----
Seattle.....	1. 66	-----	-----
Syracuse.....	1. 49	1. 30	1. 04
Tulsa.....	1. 32	1. 21	-----
Waterbury.....	1. 43	1. 20	-----

The great majority of engine-lathe operators are members of unions. There are a number of labor organizations in this field, some of the more important of which are the International Association of Machinists (Independent), the United Electrical, Radio, and Machine Workers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America.

Skilled engine-lathe operators may be promoted to such jobs as set-up man or foreman. If they can get experience on several different kinds of machine tools, they also can develop into all-round machinists. Semiskilled operators generally have less chance for advancement since they are employed mainly in production shops where the work is very repetitive, and there are few opportunities to develop additional skills.

Most machine shops are relatively clean, well lighted, and free from dust. The danger of serious accidents in machine shops is relatively small. The industries in which engine-lathe operators are employed generally have average or better-than-average safety records, in comparison with manufacturing industries in general.

*See also:* All-Round Machinists, page 234; Turret-Lathe Operators, page 239; and Set-Up Men (Machine Shop), page 244.

## Turret-Lathe Operators

(D.O.T. 4-78.020 to 4-78.029; 6-78.020 to 6-78.029)

### *Outlook Summary*

Prospects are for an increase in the number of jobs during the next few years, with the skilled operators more in demand than the semiskilled. Over the longer run, employment is expected to drop slightly, but replacement needs will create openings.

### *Nature of Work*

Turret-lathe operators are machine-shop workers specializing in running a turret lathe, a machine tool which shapes metal by rotating the metal against a series of cutting tools mounted on

a revolving turret. These jobs may be divided into two main classes according to the skill required. The skilled turret-lathe operator does varying kinds of machining. He works from blueprints or lay-outs, sets up his machine for each machining operation, and measures the finished work to see if it meets specifications. His work is much like that of the all-round machinist, except that it is limited to a single type of machine tool, the turret lathe. The semiskilled turret-lathe operator does repetitive work. Typically, his job consists of placing the metal stock in the machine, watching the machining operation for signs of trouble, and measuring the finished work with specially pre-

pared gages which simplify measurement. His machine is set up for him by a machinist or set-up man.

### *Training and Qualifications*

To become a skilled turret-lathe operator requires from 1½ to 3 years of on-the-job training. However, many of these jobs are filled by men who have completed all-round machinist 4-year apprenticeships. Semiskilled machine-tool operators are generally trained in not more than 6 months on the job.

The work is not physically strenuous and a number of women are employed as turret-lathe operators. Most of the women, however, are semiskilled operators.

### *Where Employed*

Turret-lathe operators are employed mainly in production shops, in such industries as automobiles and machinery. A number of the skilled turret-lathe operators, however, are found in jobbing machine shops, and a few work in maintenance shops in nonmetal industries. In job shops a wide variety of products may be made with relatively few of each kind. Production shops make large quantities of identical parts, and skill requirements are generally lower than in job shops.

Most of the jobs for turret-lathe operators are in the middle western and northeastern sections of the United States, with Michigan, Ohio, New York, and Pennsylvania the leading States.

### *Outlook*

The number of jobs for turret-lathe operators is expected to increase somewhat in the next few years. Increases will occur mainly in such metal-working industries as automobiles, aircraft, and heavy electrical equipment. In general, skilled operators will be more in demand than the semiskilled. After a few years, as production in many metal-working plants catches up with unsatisfied demands, the employment of turret-lathe operators will tend to drop off slightly, but should remain at a relatively high level.

Among the skilled turret-lathe operators are a number of men approaching the ages when death

or retirement will take them out of the labor force. Replacement of these workers will provide many new openings. Shifting into other occupations is common among the semiskilled operators, and opportunities for new workers will be created in this way.

### *Earnings and Working Conditions*

Many turret-lathe operators are paid on an incentive basis and hence often earn as much as machine-shop workers of greater skill. In October 1946, average straight-time hourly earnings of male turret-lathe operators (hand) in the machinery industries (except electrical machinery, machine tools, and machine-tool accessories) in large cities were as follows: Class A, \$1.40; class B, \$1.29; class C, \$1.21. Since October 1946 there generally have been wage increases in plants employing turret-lathe operators.

The great majority of turret-lathe operators are members of unions. There are a number of labor organizations in this field, some of the more important of which are the International Association of Machinists (Independent), the United Electrical, Radio, and Machine Workers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

Skilled turret-lathe operators may be promoted to such jobs as set-up man or foreman. If they can get experience on several different kinds of machine tools, they also can develop into all-round machinists. Semiskilled operators generally have less chance for advancement since they are employed mainly in production shops where the work is very repetitive and there are few opportunities to develop additional skills.

Most machine shops are relatively clean, well lighted, and free from dust. The danger of serious accidents in machine shops is relatively small. The industries in which turret-lathe operators are employed generally have average or better-than-average safety records, in comparison with manufacturing industries in general.

*See also* All-Round Machinists, page 234; Engine Lathe Operators, page 238; and Set-Up Men (Machine Shop), page 244.

## Grinding-Machine Operators

(D.O.T. 4-78.500 to 4-78.589; 6-78.500 to 6-78.589)

### *Outlook Summary*

An increase in the number of jobs is expected for the next few years; thereafter, there may be some decline in employment, but replacement needs will create openings, especially in the skilled jobs.

### *Nature of Work*

These are machine-shop workers who specialize in operating a grinding machine, a machine tool which shapes metal by means of a power-driven abrasive wheel. These jobs may be divided into two main classes, according to the skill required. The skilled grinding-machine operator does varying kinds of machining. Working from blueprints or lay-outs he sets up his machine for each machining operation, adjusts the feed and speed controls, and measures the finished work to see if it meets specifications. This job is similar to that of the all-round machinist, except that it is limited to a single type of machine tool, the grinding machine. The semiskilled grinding machine operator does repetitive work. His job typically consists of placing metal in the machine, watching the machining for signs of trouble, and measuring the finished work with specially prepared gages which simplify measurement. A machinist or set-up man sets up the machine for him.

### *Training and Qualifications*

From 2 to 4 years of on-the-job training are needed to become a skilled grinding-machine operator. However, many men qualified as all-round machinists are employed as skilled grinding-machine operators. Semiskilled machine-tool operators are generally trained in not more than 6 months on the job.

The work is not physically strenuous and a number of women are employed as grinding-machine operators. Most of the women, however, are semiskilled operators.

### *Where Employed*

Grinding-machine operators are employed mainly in production shops in such industries as

automobiles and machinery. A number of the skilled grinding-machine operators, however, are found in jobbing machine shops and a few are in maintenance shops in nonmetal industries. In job shops a wide variety of products may be made with relatively few of each kind. Production shops make large quantities of identical parts, and skill requirements are generally lower than in job shops.

Most of the jobs for grinding-machine operators are in the middlewestern and northeastern sections of the United States, with Michigan, Ohio, New York, and Pennsylvania the leading States.

### *Outlook*

During the next few years the number of jobs for grinding-machine operators is expected to increase somewhat and there will be opportunities for new workers to get trainee jobs in this occupation. Increases will occur mainly in such metal-working industries as automobiles, aircraft, and heavy electrical equipment. After a few years, employment of grinding-machine operators may drop off somewhat as production in these and other metal industries catches up with unsatisfied demand. As long as general business conditions are favorable, however, there should continue to be a large number of these jobs.

Among the skilled grinding-machine operators are a number of men approaching the ages when death or retirement will take them out of the labor force. Replacement of these workers will provide many new openings. Shifting into other occupations is common among the semiskilled operators, and opportunities for new workers will be created in this way.

### *Earnings and Working Conditions*

Many grinding-machine operators are paid on an incentive basis and hence often earn as much as machine-shop workers of greater skill. In October 1946, average straight-time hourly earnings of male grinding-machine operators in the machinery industries (except electrical machinery, machine tools, and machine-tool accessories) in large cities

were as follows: Class A, \$1.45; class B, \$1.35; class C, \$1.22. Since October 1946, there generally have been wage increases in plants employing these workers.

The great majority of grinding-machine operators are members of unions. There are a number of labor organizations in this field, some of the more important of which are the International Association of Machinists (Independent), the United Electrical, Radio, and Machine Workers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

Skilled grinding-machine operators may be promoted to such jobs as set-up man or foreman. If they can get experience on several different kinds

of machine tools, they also can develop into all-round machinists. Semiskilled operators generally have less chance for advancement since they are employed mainly in production shops where the work is very repetitive and there are few opportunities to develop additional skills.

Most machine shops are relatively clean, well lighted, and free from dust. The danger of serious accidents is relatively small. The industries in which grinding-machine operators are employed generally have average or better-than-average safety records, in comparison with manufacturing industries in general.

*See also* All-Round Machinists, page 234, and Set-Up Men (Machine Shop), page 244.

## Milling-Machine Operators

(D.O.T. 4-78.030 to 4-78.039; 6-78.030 to 6-78.039)

### *Outlook Summary*

A small increase in the number of jobs is expected during the next few years. Over the longer run, employment is expected to drop off somewhat, but replacement needs will provide openings for new workers.

### *Nature of Work*

Milling-machine operators are machine-shop workers specializing in running a milling machine, a machine tool which shapes metal with a saw-tooth cutting tool. These jobs may be divided into two main classes according to the kind of skill required. The skilled milling-machine operator does varying kinds of machining. He works from blueprints or lay-outs, sets up his machine for each machining operation, and verifies dimensions of work. The semiskilled milling-machine operator does repetitive work. Typically, his job consists of placing metal in the machine, watching the machining for signs of trouble, and measuring the finished work with specially prepared gages which simplify measurement. A machinist or set-up man sets up the machine for him.

### *Training and Qualifications*

To become a skilled milling-machine operator

requires from 1½ to 3 years of on-the-job training. However, many of these jobs are filled by men who have completed all-round machinist apprenticeships. Semiskilled milling-machine operators are generally trained in not more than 6 months on the job.

The work is not physically strenuous and a number of women are employed as milling-machine operators. However, most of the women are semiskilled operators.

### *Where Employed*

Milling-machine operators are employed mainly in metalworking industries, such as machinery and automobiles. A number of the skilled milling-machine operators work in jobbing machine shops and a few are employed in maintenance shops in nonmetal industries. Most semiskilled operators are employed in production shops. In job shops a variety of products may be made with relatively few of each kind. Production shops make large quantities of identical parts, and skill requirements are generally lower than in job shops.

Most of the jobs for milling-machine operators are in the Middle West and Northeast, with Michigan, Ohio, New York, and Pennsylvania the leading employers.



*Outlook*

The number of jobs for milling-machine operators is expected to increase somewhat in the next few years. Increases will occur mainly in such metalworking industries as automobiles, aircraft, and industrial electrical equipment. In general, skilled operators will be more in demand than the semiskilled. After a few years, as production in many metalworking plants catches up with unsatisfied demands, the number of jobs for milling-machine operators will tend to decrease slightly, but should remain at a relatively high level.

Among the skilled milling-machine operators are a number of men approaching the ages when death or retirement will take them out of the labor force. Replacement of these workers will provide numerous openings. Shifting into other occupations is common among the semiskilled operators, and opportunities for new workers will be created in this way.

*Earnings and Working Conditions*

Many milling-machine operators are paid on an incentive basis and hence often earn as much as machine-shop workers of greater skill. In October 1946, in large cities, average straight-time hourly earnings of male milling-machine operators in the machinery industries (except electrical machinery, machine tools, and machine-tool acces-

sories) were as follows: Class A, \$1.42; class B, \$1.28; class C, \$1.20. Since October 1946, there generally have been wage increases in plants employing these workers.

Skilled milling-machine operators may be promoted to such jobs as set-up man or foreman. If they can get experience on several different kinds of machine tools, they also can develop into all-round machinists. Semiskilled operators generally have less chance for advancement since they are employed mainly in production shops where the work is very repetitive and there are few opportunities to develop additional skills.

Most machine shops are relatively clean, well lighted, and free from dust. The danger of serious accidents is relatively small. The industries in which milling-machine operators are employed generally have average or better-than-average safety records, in comparison with manufacturing industries in general.

The great majority of milling-machine operators are members of unions. There are a number of labor organizations in this field, some of the more important of which are the International Association of Machinists (Independent), the United Electrical, Radio, and Machine Workers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

## Shaper Operators

(D.O.T. 4-78.060 to 4-78.069)

*Outlook Summary*

Prospects are for a fairly steady employment level in this small occupation during the next several years; over a longer period employment is likely to drop somewhat, but replacement needs will create openings for a few new workers.

*Nature of Work*

These are machine-shop workers specializing in operating shapers (machine tools which form a flat surface of metal by moving a cutting tool back and forth over the surface). This is a relatively small occupation, because of the specialized uses of the shaper. The workers are usually skilled. The job generally requires working from

blueprints or lay-outs, setting up the shaper for each machine operation, and measuring the finished work to see if it meets specifications. The work is comparable to that of the all-round machinist except that it is limited to one machine tool, the shaper. Training of shaper operators may consist of a 4-year machinist apprenticeship or several years of on-the-job training in the operation of the machine.

*Where Employed*

Shaper operators are employed mainly in jobbing shops in various machinery industries, particularly machine-tool plants and tool and die shops. Relatively few are employed in production

shops. In job shops a wide variety of products may be made with relatively few of each kind. Production shops make large quantities of identical parts, and skill requirements are generally lower than in job shops.

Most of the jobs for shaper operators will be in the middle western and northeastern sections of the United States, with Michigan, Ohio, New York, and Pennsylvania, the leading States.

### *Outlook*

During the next few years the number of jobs for shaper operators should continue at about the present, relatively high level. It is unlikely that

the industries, such as machine tools, which employ the bulk of these workers will experience sharp changes in employment in the near future. Over a long period, the number of jobs for shaper operators may decrease slightly, particularly if other machine tools are substituted for the shaper in certain uses. However, because a high percentage of shaper operators are older men, approaching the age when death or retirement will take them from the labor force, there will be openings for new workers to replace these men. Nevertheless, because this is a small occupation, these openings will be relatively few in number.

*See also* All-Round Machinists, page 234.

## Set-Up Men (Machine Shop)

(D.O.T. 4-75.160)

### *Outlook Summary*

Prospects during the next few years are for a small number of openings for men with experience as all-round machinists or skilled machine-tool operators. Over the longer run continued high employment is likely.

### *Nature of Work*

The set-up man is a skilled specialist employed in machine shops which carry on large-volume production. His job is to install cutting tools and adjust the controls of machine tools so that they can be run by semiskilled operators.

The usual practice is to assign a set-up man to a number of machine tools, which are often of one type, such as the turret lathe. The set-up man works from blueprints, written specifications, or job lay-outs in order to set the cutting tools in place and to adjust, for each machining operation, the guides, speed and feed controls, working tables, and other parts of machine tools. After setting up and adjusting a machine, he makes a trial run to see if it is working properly, and then turns it over to the regular operator. During the machining operation he makes all important adjustments needed for accurate production.

### *Training and Qualifications*

In order to become a set-up man, it is usually necessary to qualify first as an all-round machinist

or as a skilled machine-tool specialist, since the job requires a good background in machine-shop practice as well as a thorough knowledge of the operation of at least one type of machine tool. This is essentially a man's job, although great physical strength is not required.

### *Where Employed*

Set-up men are employed in a variety of metal-working industries, especially in plants making automobiles and machinery. Most of the jobs for set-up men are in the Middle West and Northeast, with Michigan, Ohio, Illinois, New York, and Pennsylvania the leading States.

### *Outlook*

Employment prospects for set-up men are generally favorable for the next several years. Metal-working employment as a whole is expected to rise, with marked increases coming in some of the industries, such as automobiles and aircraft, which use relatively large numbers of these workers. Thus, a number of experienced machinists and skilled machine-tool operators will be able to get jobs as set-up men. After a few years, openings for set-up men will be reduced as the backlog of demand for many metal products is wiped out. However, the trend toward specialization in machine-shop work will tend to provide continued employment.

*Earnings and Working Conditions*

In October 1946, set-up men employed in the machinery industries (except electrical machinery, machine tools, and machine-tool accessories) in large cities had average straight-time hourly earnings of \$1.43. Since that date, there generally have been wage increases in plants employing set-up men.

The great majority of set-up men are members of unions. There are a number of labor organizations in this field, some of the more important of which are the International Association of Machinists (Independent), the United Electrical, Radio, and Machine Workers of America (CIO),

and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

Most machine shops are relatively clean, well lighted, and free from dust. The danger of serious accidents in machine shops is relatively small. The industries in which set-up men are employed generally have average or better-than-average safety records, in comparison with manufacturing industries in general.

*See also:* All-Round Machinists, page 234; Engine-Lathe Operators, page 238; Turret-Lathe Operators, page 239; Grinding-Machine Operators, page 241; and Milling-Machine Operators, page 242.

## Lay-Out Men (Machine Shop)

(D.O.T. 4-75.140)

*Outlook Summary*

There will be openings for a small number of experienced, all-round machinists to get into this field during the next few years; longer run prospects are for stable employment.

*Nature of Work*

The lay-out man is a highly skilled specialist whose job is to make guide marks on metal before it is machined to indicate to the machine-tool operators the kind of machining needed.

Working from blueprints or written specifications, the lay-out man marks guide lines, reference points, and other instructions to operators on rough castings, forgings, or metal stock. He uses a wide assortment of instruments, including the scribe, with which he marks lines on the surface of the metal; the center punch, used to indicate the centers on the ends of metal pieces to be machined or drilled; the keyseat or box rule, used for drawing lines and laying off distances on curved surfaces; dividers, for transferring and comparing distances; L- or T-squares for determining right angles; and calipers and micrometers for accurate measurement. Not only must the lay-out man work with extreme accuracy, but he has also to be familiar with the operation and uses of each of the standard machine tools.



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

The lay-out man must have a broad knowledge of machine-shop work and be able to use marking and measuring instruments.

*Training and Qualifications*

In general, it takes from 6 to 10 years to develop this skill, including the machinist apprenticeship or equivalent training needed to learn the funda-

mentals of machine-shop practice. A high-school education, including courses in geometry, trigonometry, and mechanical drawing is often required; additional preparation in a trade or technical school is considered desirable.

#### *Where Employed*

Lay-out men are employed in various metalworking industries especially in plants making automobiles or machinery. Most of the jobs for lay-out men are in the mid-western and north-eastern sections of the country, particularly in the States of Michigan, Ohio, Illinois, New York, and Pennsylvania.

#### *Outlook*

Prospects are for a slight increase in employ-

ment in this small occupation during the next few years. Metalworking employment as a whole is expected to rise, with marked increases coming in automobile plants and other employers of lay-out men. Thus, a small number of experienced all-round machinists will be able to get jobs as lay-out men. Over a longer period, metalworking employment, generally, will drop off somewhat as the backlog of demand for many metal products is wiped out. However, the trend toward using skilled lay-out men in conjunction with semiskilled machine-tool operators in many shops, is expected to continue; this will tend to maintain the number of lay-out jobs at a relatively high level.

*See also* All-Round Machinists, page 234.

# Foundry Occupations

## *Foundries and Foundry Products*

Foundries are places where castings are made. A casting is formed by pouring molten metal into a mold and allowing the metal to solidify, taking the shape of the mold. This is one of industry's basic metalworking methods since it can produce metal parts in a wide range of shapes and sizes. Castings in general use include, for example, automobile cylinder blocks, water mains, bathtubs, machinery bearings, ship propellers, railway car wheels, machine-tool bases, radiators, valve bodies, and locomotive frames.

Casting is applied to a number of different metals and their alloys. Gray iron accounts for most of the tonnage. Steel and malleable iron are the other important types of ferrous metals which are cast. Among the nonferrous metals, brass, bronze, aluminum, and magnesium are the main casting materials. Foundries usually specialize in casting one or two particular metals, since somewhat different kinds of equipment and methods are used for the various metals. Most foundry workers can transfer, however, from casting one type of metal to another without much extra training.

Foundries differ greatly in the way their production is organized. *Production* foundries make large quantities of identical castings, using mainly machine methods and requiring relatively few skilled workers. Many of the production foundries are captive or integrated foundries, that is, they are departments or subsidiaries of plants which use castings in manufacturing finished products such as automobiles, various types of machinery, agricultural implements, plumbing and heating equipment, or electrical machinery. *Jobbing foundries*, on the other hand, make a variety of shapes and sizes of castings, usually in limited quantities. To a great extent, hand methods are employed and a relatively high propor-

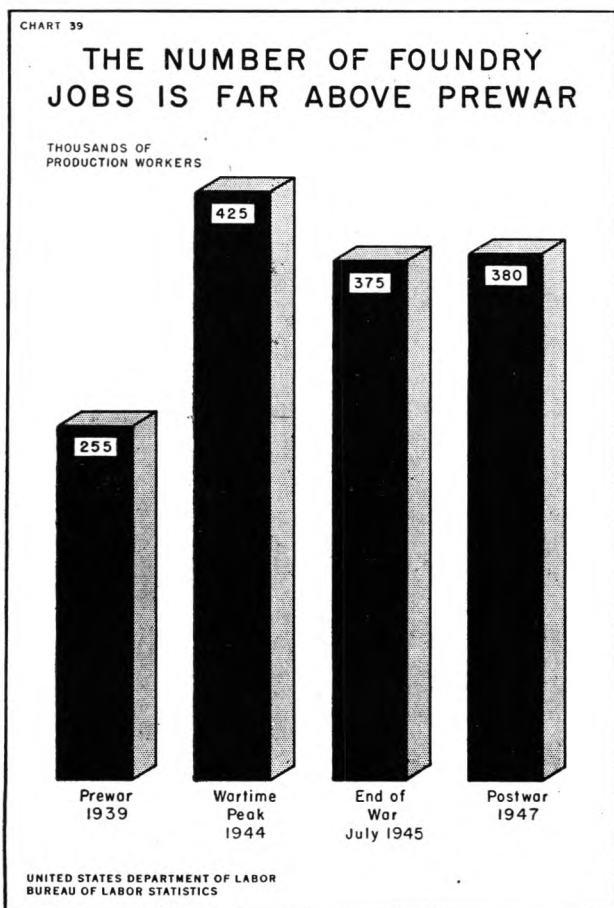
tion of skilled workers is required. Jobbing foundries are usually separate establishments (independent or commercial foundries), selling their castings to other companies.

## *General Employment Outlook*

Foundries will provide a large number of jobs for new workers during the next several years. Rising output of foundry products is in prospect, and many foundries will increase their employment. In addition, there will be numerous job openings created by the replacement of workers leaving the foundries.

As chart 39 shows, foundry employment is currently at a high level; it is far above prewar, slightly higher than at the end of the war, and not so much short of the wartime peak. About 380,000 production workers are employed in foundries, including both independent and integrated foundries. High production of castings has resulted from the expanding needs of many of the industries which use castings—including particularly the automobile, electrical equipment, farm machinery, industrial equipment, plumbing and heating supplies, and railroad-equipment industries. Continued strong demand for castings for these and other metal-products industries is likely for the next several years, with even increased demand expected in many cases. Government programs for expanded production of military aircraft and ships will require higher output of certain types of castings. Prospects are, therefore, for higher output of castings and for rising foundry employment, although shortages of pig iron, scrap, and coke may temporarily hinder greater production of iron and steel castings. There are differences in outlook, however, among the various major classes of foundries.

In *gray-iron foundries*, which have about 200,000 workers (more than half of all foundry jobs), production has been at an all-time high. Large



quantities of gray-iron castings are used in the manufacture of automobiles and trucks, machine tools, and other types of industrial machinery, electric motors and generators, steel-mill equipment, and construction materials (including cast-iron pipe, radiators, bathtubs, etc.). Several years of record output of gray iron will probably be required to meet the needs for castings for these and other metal products. For the immediate future, however, there is not much chance of increasing employment to any great extent in gray-iron foundries, because of continuing shortages of materials such as pig iron and coke.

In *steel foundries*, which have about 70,000 workers, rising employment is likely during the coming few years. Stepped-up production of railway equipment, which takes a very large share of steel castings output, will be the main factor in this increase. Other important markets for steel castings include such expanding fields as shipbuilding,

construction and mining machinery, power-plant equipment, and steel-mill machinery.

The number of jobs in *malleable-iron foundries* will probably rise somewhat above the present level of about 35,000. Increased production of malleable castings will be required to meet the needs of many of the industries which are important users of this type of casting, including the automobile, farm machinery, and railroad-equipment industries.

Employment in the *nonferrous foundries* is the highest ever achieved in peacetime (75,000) and is likely to rise above this level during the next several years. Output of brass and bronze castings will be kept at a high rate by the demands of such industries as automobiles, plumbing supplies, and industrial machinery. Aluminum castings production was expanded tremendously during the war, dropping very sharply after VJ-day. It has recovered substantially, however, with new markets for aluminum opening up in the household equipment, automotive, and other fields. Moreover, stepped-up production of military aircraft will contribute to the demand for aluminum castings. Output of magnesium castings also was enormously increased during the war, but today only a small number of workers are employed in magnesium foundries.

Employment opportunities in foundry work will be created not only by the expected rise in total foundry employment, but also by the need to replace those workers who leave the foundries. Openings resulting from death and retirement may run about 6,000 to 10,000 annually. Replacement demand of this kind will be especially important in the more skilled foundry occupations, in which there are many workers of relatively advanced age. An even greater number of openings, however, will arise from turn-over; that is, the shifting of experienced foundry workers into other kinds of employment. In the semiskilled and unskilled foundry occupations, most of the job openings will arise in this way.

Over a longer period, the backlog of demand for many metal products, such as automobiles, will be satisfied and the production of castings probably will be reduced. In addition, continued technical advances in foundry methods will have an effect on foundry employment. Some of the more important technological changes will include

greater use of permanent-mold casting and more extensive installation of material handling equipment, and as a result fewer workers will be needed to produce a given amount of castings. These technological advances, together with the expected dropping off in the demand for castings, will mean some reduction in foundry employment. As long as general business conditions are good, however, the decrease should not be sharp enough to cause unemployment of experienced foundry workers in any numbers, although there will be fewer openings for new workers.

All in all, the trends in foundry employment are favorable, in terms both of getting a foundry job during the next few years and of holding onto the job over a longer period. There are, however, some differences in outlook among the various foundry occupations. Opportunities in some of the more important foundry occupations are summarized in the statements for the individual occupations.

#### *The Foundry Occupations*

Foundries constitute one of the most important fields of employment for trained workers in manufacturing. Molding, coremaking, and patternmaking are the main skilled occupations in foundries. There are, of course, many other occupations represented, including maintenance workers (such as carpenters and electricians), a large number of laborers, and clerical and professional employees.

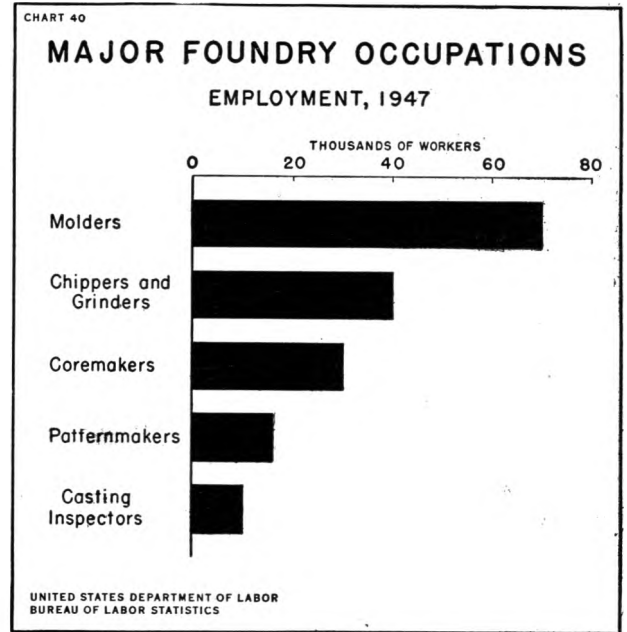
The foundry occupations are mainly limited to men, reflecting the strenuous nature of much of the work as well as certain traditional employment practices. During the war a large number of women came into the foundries, but relatively few of them have remained.

The proportion of Negroes in foundries is markedly high; they constitute more than one-fourth of all production workers in independent ferrous foundries. They are employed not only in many unskilled and semiskilled foundry occupations, but also to a substantial extent as skilled molders and coremakers. In March 1940, Negroes comprised about 8 percent of the employed molders reported in the Census of Population.

Among the many types of foundry jobs, three occupations—molder, coremaker, and patternmaker—stand out as especially significant. Mold-

ing and coremaking are relatively large occupations and include a high proportion of skilled jobs requiring apprenticeship or equivalent training. Although fewer workers are engaged in patternmaking, the skill needed is very high and apprenticeship is the normal method of entry.

Employment in the principal foundry occupations is shown in chart 40.



The first step in casting is to make a wood or metal pattern in the shape of the final casting desired. *Patternmakers*, highly skilled craftsmen, are classified according to the kind of material they use in making patterns. Those who construct wooden patterns constitute about two-thirds of the total. Of the remainder, most are metal patternmakers, although there are a few who work with other materials, such as plaster. *Hand molders* prepare the sand molds into which metal is poured. The molds are made by packing and ramming sand around the patterns. Molds for smaller castings are usually made on a workbench by *bench molders*; *floor molders* make molds for large and bulky castings on the foundry floor. A *machine molder* operates one of several types of machines which simplify and speed up the making of large quantities of identical sand molds. *Hand coremakers* shape the bodies of sand, or "cores," which are placed inside molds in order to form any hollow spaces needed in castings. *Ma-*

*chine coremakers* are employed mainly in production foundries, where large quantities of identical castings are made for use in such finished products as automobiles, agricultural machinery, and household appliances.

With the mold made and the cores, if any, put inside, the next step is to pour the molten metal into the mold. A *melter* operates a furnace used to melt metal for castings. The actual pouring is customarily done by a *pourer*, although in some small foundries it is part of the molder's job. When the casting has cooled off it is taken out of the mold (this is called "shaking out") and sent to the cleaning and finishing department, where *chippers* remove the excess metal from castings by means of pneumatic hammers or hand hammers and chisels. *Grinders*, using a mechanically powered abrasive wheel, smooth and finish the casting. Although chipping and grinding may be separate occupations, they are often combined into one job, especially in the smaller foundries. *Castings inspectors* then check finished castings for structural soundness and proper dimensions.

*Foundry technicians* are a group of skilled workers having to do with quality control in the

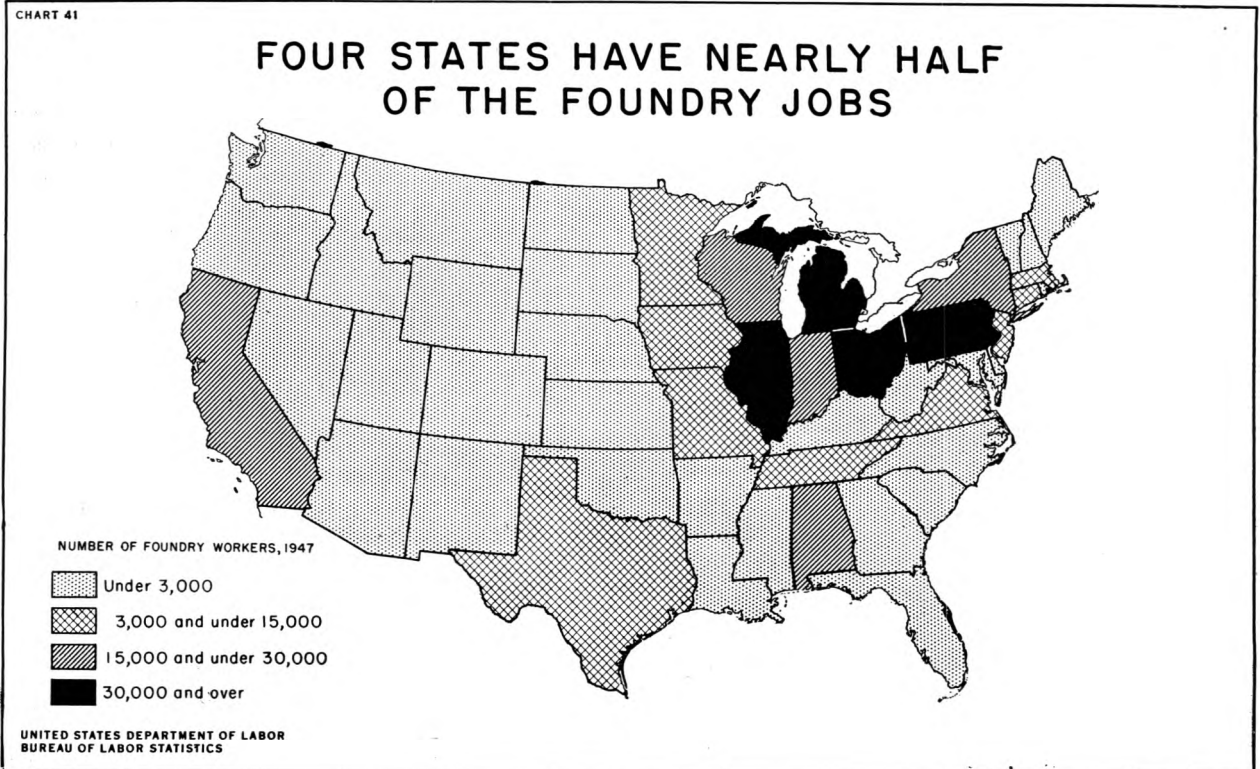
making of castings. Included are workers with such specialized duties as testing of molding and coremaking sands, chemical analysis of metal, operation of machines which test the strength and hardness of castings, and the use of X-ray or magnetic apparatus to inspect the internal structure of castings.

*Earnings and Working Conditions*

Wages in foundries compare favorably with those in the metalworking industries generally. Shown below are average weekly earnings in independent iron and steel foundries, compared with earnings in the entire group of industries making iron and steel and their products and in all manufacturing.

	<i>Average weekly earnings, January 1948</i>
Gray iron foundries.....	\$57.31
Malleable iron foundries.....	59.03
Steel foundries.....	59.86
Cast iron pipe foundries.....	51.25
Iron and steel industry group.....	57.66
All manufacturing.....	52.14

The above earnings include extra pay for overtime and night work.





The working environment varies greatly among individual foundries. In some, the conditions compare favorably with metalworking industries generally; in others, safety and comfort are below the average for metalworking. The injury rate in foundries tends to be relatively high, but there has been considerable improvement of working conditions in recent years.

The frequency of accidents varies among the different kinds of foundry work. In general, patternmaking and coremaking are the least hazardous, molding is somewhat more unsafe, and jobs in melting and chipping tend to have among the highest injury rates.

#### *Where Are the Foundry Jobs?*

As the map (chart 41) shows, most of the foundry jobs are in the Midwestern and Northeastern

States. Foundries tend to be near the great concentrations of metalworking industries for which they produce castings and near the supply of such basic material as pig iron, coke, and nonferrous metals. The leading foundry States are Ohio, Pennsylvania, Illinois, and Michigan. However, foundry jobs appear in substantial numbers in other parts of the country: Alabama, for example, has many foundry workers; in California, foundry employment has recently become more important. Every State has some foundry jobs.

#### *Where To Get More Information*

Employment Outlook in Foundry Occupations. Bulletin No. 880. U. S. Bureau of Labor Statistics, 1946. 56 pp. 15 cents, Superintendent of Documents, Washington 25, D. C.

## Hand Molders

(D.O.T. 4-81.010 and .030)

#### *Outlook Summary*

There will be a number of openings for new workers during the next several years. Over a longer period, employment in the occupation will decline somewhat; however, journeymen molders will be in a much better position than the less skilled molders.

#### *Nature of Work*

These foundry workers use mainly hand methods to prepare the sand molds into which metal is poured to make castings. A mold is made by packing and ramming prepared sand around a model or pattern of the desired casting and then removing the pattern, leaving in the sand a hollow space in the shape of the casting to be made. Molds for smaller castings are usually made on a workbench by *bench molders*; those for large and bulky castings are made on the foundry floor by *floor molders*. Skill requirements in this occupation differ considerably. An all-round hand molder (journeyman) makes widely varying kinds of molds. A less skilled molder does more repetitive work, specializing on a single kind of mold.

#### *Where Employed*

Hand molders work mainly in jobbing foundries; in production foundries, some journeymen molders are employed in skilled, specialized molding jobs and in supervisory positions. Production foundries make large quantities of identical castings, using mainly machine methods and requiring relatively few skilled workers. Many of the production foundries are "captive" or "integrated" foundries; that is, departments of plants which use castings in manufacturing finished products, such as automobiles, various types of machinery, agricultural implements, plumbing and heating equipment, or electrical machinery. Jobbing foundries, on the other hand, make a variety of shapes and sizes of castings, usually in limited quantities. To a great extent, hand methods are employed and a relatively high proportion of skilled workers is required. Jobbing foundries are usually separate establishments (independent or commercial foundries), selling their castings to other companies.

Although foundries tend to specialize in casting one or two metals—gray iron, steel, malleable

iron, brass, bronze, aluminum, or magnesium—hand molders usually can transfer, with little additional training, from one type of foundry to another.

Most of the hand molders work in the Midwestern and Northeastern regions, with Ohio, Pennsylvania, Illinois, Michigan, Indiana, and New York the leading States.

### *Training and Qualifications*

Completion of a 4-year apprenticeship, or the equivalent in experience, is needed to become a journeyman molder and thus to qualify for all-round hand molding and for the skilled specialized or supervisory jobs. Men with this training are also preferred for many kinds of machine molding. For the less skilled jobs, less than 6 months of on-the-job training is usually required.

For a molding apprenticeship, an eighth grade education is usually the minimum, and many employers specify additional school work up to and including high school graduation. Eighth grade schooling, however, suffices for most jobs as learners of less skilled hand molding.

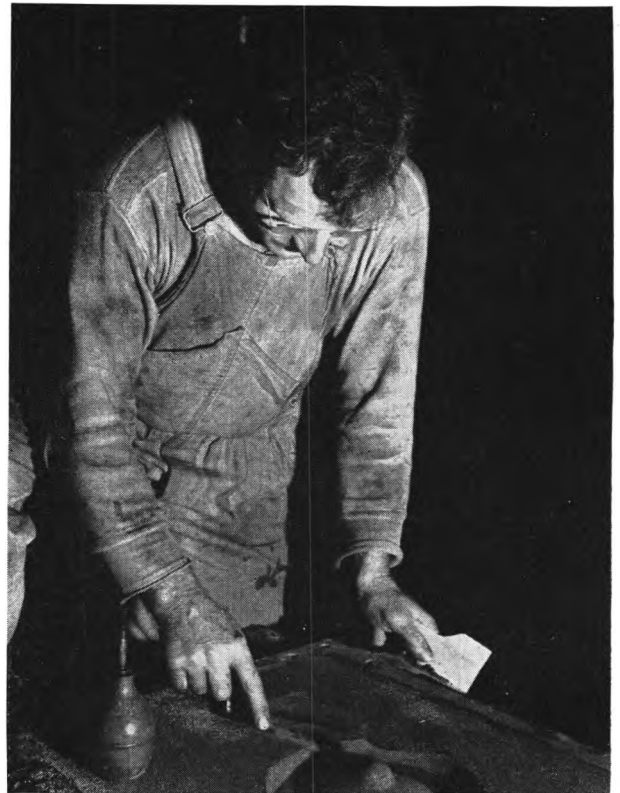
Full-time 1- or 2-year trade school courses in molding are available in many localities. If the school's equipment is adequate and its instruction of good quality, useful preparation for the molding trade may be provided in that the trade school course may be credited toward completion of the molding apprenticeship. However, these schools cannot qualify their students for jobs as journeyman molders without an additional period of work experience.

Physical standards for molding jobs take into account the needs for continual standing and moving about, frequent lifting, good vision, and manual dexterity. Since the work is fairly strenuous, very few women are employed in this occupation. There are a fairly large number of Negroes in molding jobs.

### *Outlook*

In general, the employment outlook for hand molders is favorable. Expanding output in such industries as automobiles, electric-power equipment, farm and construction machinery, and railroad equipment, which are among the major users of castings, should keep foundry employment at a

peacetime high. As between the two skill grades, however, prospects are better for journeymen because of their varied skills. A high proportion of journeymen now employed are of relatively advanced age, nearing the time when they will have to be replaced. During the next few years, more journeymen will be needed than are likely to be available and many new workers will enter the occupation. Currently, molder apprentice openings are scarce in most areas, because of the large number of apprentices taken on since the end of the war. However, after a year or two, many of these men will complete their training, and there should be numerous openings for apprentices.



COURTESY OF NATIONAL ARCHIVES

A floor molder smoothing sand mold.

Over the longer run, employment of hand molders, along with foundry employment generally, is expected to drop off somewhat as the backlog of demand for many metal products is satisfied and the requirements for castings are thus reduced. Moreover, greater use of machine molding, permanent-mold casting, and other technical advances

will cut down the number of openings for new workers. Experienced journeymen, however, should continue to have jobs, since they will be needed to supervise less skilled workers and to make molds which cannot be produced by machines.

For at least several years there will be enough jobs for experienced less skilled hand molders, and some opportunities for beginners are expected. Technical advances will affect this kind of molding more than the other types, and employment of hand molders will be reduced. However, those who get the equivalent of the journeyman's training will have very good chances for continued employment.

*Earnings and Working Conditions*

Hand molders are among the highest paid foundry workers. Average straight-time hourly earnings of male floor and bench molders in independent ferrous foundries in selected large cities in November 1947 are shown below :

City	Molders, hand, floor	Molders, hand, bench
Baltimore	\$1. 44	\$1. 36
Birmingham	1. 24	1. 08
Boston	1. 49	1. 49
Buffalo	1. 63	1. 55
Chicago	1. 61	1. 63
Cincinnati	1. 57	1. 45
Cleveland	1. 70	1. 62
Denver	1. 40	1. 40
Detroit	1. 84	1. 82
Hartford, Conn.	1. 58	1. 35
Houston	1. 53	1. 41
Indianapolis	1. 53	1. 48
Los Angeles	1. 69	1. 58
Milwaukee	1. 80	1. 43

City	Molders, hand, floor	Molders, hand, bench
Minneapolis-St. Paul	\$1. 41	\$1. 42
Newark	1. 49	1. 53
New York	1. 55	1. 51
Philadelphia	1. 67	1. 50
Pittsburgh	1. 57	1. 50
Portland, Oreg.	1. 64	1. 64
San Francisco	1. 63	1. 67
Seattle	1. 64	1. 64
Toledo	1. 66	1. 52

Apprentices generally start at from one-third to one-half of the journeyman rate, and their pay rises gradually during the apprenticeship period.

Hand molders with all-round training have good chances for promotion to supervisory jobs. Opportunities for advancement are much more limited for the less-skilled hand molders.

Working conditions for molders vary greatly among individual foundries. In some, conditions compare favorably with metalworking industries generally; in others, safety and comfort are below the average for metalworking. The injury rate in foundries tends to be relatively high, although there has been considerable improvement of working conditions in recent years.

Like other foundry workers, the large majority of hand molders are union workers. The principal labor organizations covering these workers include the International Molders and Foundry Workers Union of North America (AFL), the United Steelworkers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

*See also:* Machine Molders, page 253, and Hand Coremakers, page 255.

## Machine Molders

(D.O.T. 4-81.050; 6-81.010 and .020)

*Outlook Summary*

An increase in the number of jobs is likely during the next few years. Replacement needs will provide many job opportunities for new workers. Over the longer run, employment should remain fairly stable.

*Nature of Work*

Machine molders are foundry workers who operate one of several types of machines which simplify and speed up the making of large quantities of identical sand molds for castings. The basic duties of a machine molder consist mainly of as-

sembling the flask (molding box) and pattern on the machine table, filling the flask with prepared sand, and operating the machine by the properly timed use of its control levers and pedals. Machine molders sometimes are qualified journeyman molders who require little supervision and who set up and adjust their own machines. More commonly, however, the machine molder is a semi-skilled worker, whose duties are limited to operating the machine which is set up for him.

#### *Where Employed*

Machine molders are employed mainly in production foundries—those which make large quantities of identical castings for use in such products as automobiles, agricultural machinery, and household appliances. Many of these foundries are departments of plants which use the castings in their products. Other machine molders work in independent foundries producing castings for sale. Although foundries tend to specialize in casting one or two metals—gray iron, steel, malleable iron, brass, bronze, aluminum, or magnesium—machine molders usually can transfer, with little or no extra training, from one type of foundry to another.

Most of the jobs for machine molders are in the midwestern and northeastern regions, with Ohio, Pennsylvania, Illinois, Michigan, Indiana, and New York the leading States.

#### *Training and Qualifications*

For molding-machine jobs of the more difficult and responsible types, a 4-year molder apprenticeship or equivalent training is required. However, machine molding of the less skilled variety, in which close supervision is provided and finishing is delegated to other workers, is ordinarily learned in from 60 to 90 days of on-the-job training.

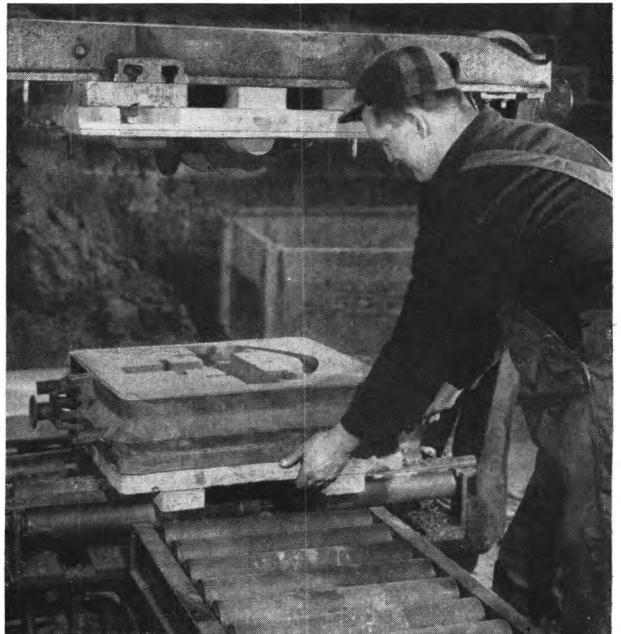
In general, average physical strength is needed for machine molding. A very small number of women are employed in the occupation.

#### *Outlook*

The number of jobs for machine molders is expected to increase during the next few years. The expanding needs of many of the industries which are among the most important users of castings should keep the Nation's foundries producing at

a very high rate. These industries include particularly automobiles, farm machinery, plumbing and heating supplies, and railroad equipment.

Over a longer period, foundry employment may drop off somewhat, as the backlog of demand for many metal products is satisfied and the production of castings is thus reduced. However, the number of machine molders is expected to remain fairly stable, because the trend toward wider use of machine methods in place of hand molding will tend to offset any decrease in foundry activity.



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Machine molders operate machines which simplify and speed up the making of a large quantity of identical molds.

Since shifting into other occupations is common among semiskilled machine molders, there will be many openings for new workers to replace them. The ranks of the more skilled machine molders include a considerable proportion of older men who will have to be replaced within a few years.

#### *Earnings and Working Conditions*

Average straight-time hourly earnings (excluding premium pay for overtime and night work) of men operating molding machines in independent ferrous foundries in selected large cities in November 1947 are shown in the following statement.

Baltimore.....	\$1. 46	Los Angeles.....	\$1. 71
Birmingham.....	1. 23	Milwaukee.....	1. 91
Boston.....	1. 47	Minneapolis-St.Paul..	1. 39
Buffalo.....	1. 78	Newark.....	1. 68
Chicago.....	1. 78	New York.....	1. 92
Cincinnati.....	1. 57	Philadelphia.....	1. 67
Cleveland.....	1. 85	Pittsburgh.....	1. 57
Denver.....	1. 46	Portland (Oreg.)....	1. 71
Detroit.....	1. 93	San Francisco.....	1. 72
Hartford (Conn.)...	1. 84	Seattle.....	1. 60
Houston.....	1. 38	Toledo.....	1. 81
Indianapolis.....	1. 71		

A machine molder who has completed an apprenticeship or acquired other all-round molding experience is often in line for promotion to a supervisory job. A semiskilled machine molder, however, generally has much less chance for advancement.

Working conditions vary greatly among individual foundries. In some, conditions compare favorably with metalworking industries generally; in others, safety and comfort are below the average for metalworking. The injury rate in foundries tends to be relatively high, although there has been considerable improvement of working conditions in recent years.

Like other foundry workers, the large majority of machine molders are union members. The principal labor organizations covering these workers include the International Molders and Foundry Workers Union of North America (AFL), the United Steelworkers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

*See also Hand Molders, page 251.*

## Hand Coremakers

(D.O.T. 4-82.010)

### Outlook Summary

Prospects are for a moderate increase in the number of jobs for hand coremakers during the next few years. Over a longer period, employment in this occupation is expected to decline somewhat.

### Nature of Work

These foundry workers use mainly hand methods to prepare the bodies of sand, or cores, which are placed in molds to form hollows or holes required in metal castings. A core is made by packing prepared sand into a hollow form (core box) so that the sand is compressed into the desired shape. Small cores are made on a work bench by *bench coremakers*; large and bulky cores are made on the foundry floor by *floor coremakers*. Skill requirements in this occupation differ considerably. All-round hand coremakers (journeymen) prepare a variety of larger or more intricate cores. The less skilled coremakers make the small and simple cores, frequently produced in large numbers, so the work is highly repetitive.

### Where Employed

Journeymen hand coremakers usually work in



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Bench coremakers use mainly hand methods to prepare the bodies of sand, or "cores," which are placed in molds to form the hollows or holes required in metal castings.

jobbing foundries, which make castings of various shapes and sizes in limited quantities. Most jobbing foundries are independent establishments, selling their castings to other firms. Semiskilled hand coremakers are generally employed in production foundries, where large quantities of identical castings are made, so that coremaking is mainly repetitive. Many of the production foundries are captive or integrated foundries, that is, they are departments or subsidiaries of plants which use castings in manufacturing finished products, such as automobiles, farm machinery, or plumbing supplies. Some journeymen coremakers work in production foundries as supervisors or in skilled, specialized jobs.

Although foundries tend to specialize in casting one or two metals—gray iron, steel, malleable iron, brass, bronze, aluminum, or magnesium—hand coremakers usually can transfer, with little additional training, from one type of foundry to another.

Most of the hand coremakers work in the midwestern and northeastern regions, with Ohio, Pennsylvania, Illinois, Michigan, Indiana, and New York the leading States.

#### *Training and Qualifications*

Completion of a 4-year apprenticeship, or the equivalent in experience, is needed to become a journeyman coremaker. Molding and coremaking training is often combined in a single apprenticeship. For the less skilled jobs, only a few months of on-the-job training is usually required.

For coremaking apprentices an eighth-grade education is usually the minimum, and many employers specify additional school work up to and including high-school graduation. Eighth-grade schooling, however, suffices for most jobs as learners of less skilled hand coremaking.

Full-time 1- or 2-year trade-school courses in molding, coremaking, or general foundry work are available in many localities. If the school's equipment is adequate and its instruction of good quality, useful preparation for the coremaking trade may be provided in that the trade-school course may be credited toward completion of the coremaking apprenticeship. However, these schools cannot qualify their students for jobs as skilled coremakers without an additional period of work experience.

Physical requirements for light coremaking are fairly modest, since the work is not strenuous; women are frequently employed in the less skilled coremaking jobs.

#### *Outlook*

The number of hand-coremaker jobs should increase somewhat during the next few years. Foundry employment is already at a peacetime high, and further increases are likely in some types of foundries. Many industries which are important users of castings, including automobile, farm-machinery, and power-plant equipment producers, are expected to expand their output, creating a bigger demand for castings, and, in turn, more jobs for coremakers. Journeymen coremakers will be in especially strong demand, with replacement needs becoming more important because of the advanced age of many of these men. Although apprentice openings are currently somewhat scarce in many localities because of the large number of apprentices now in training, there should be a relatively large number of openings after a year or two. At the less skilled level, shifting of experienced workers into other occupations will create jobs for beginners.

Over a longer period, the number of hand coremaking jobs will decline slightly, because foundry production will drop somewhat when the backlog of demand for many metal products is satisfied, and because of greater use of coremaking machines. Although opportunities for semiskilled coremakers will be reduced by greater use of machines, journeymen will be less affected, since the work of the latter is less subject to mechanization and because journeymen will continue to be needed on supervisory jobs.

#### *Earnings and Working Conditions*

Hand coremakers are among the better paid foundry workers. Average straight-time hourly earnings of male hand coremakers in selected large cities in independent ferrous foundries in November 1947 are shown below:

Baltimore .....	\$1.34	Cleveland.....	\$1.69
Birmingham .....	1.10	Denver .....	1.36
Boston .....	1.50	Detroit .....	1.84
Buffalo .....	1.71	Hartford (Conn.)...	1.34
Chicago.....	1.73	Houston .....	1.45
Cincinnati .....	1.45	Indianapolis .....	1.53

Los Angeles-----	\$1. 54	Pittsburgh-----	\$1. 55
Milwaukee-----	1. 72	Portland (Oreg.)---	1. 61
Minneapolis-St. Paul-	1. 37	San Francisco -----	1. 63
Newark-----	1. 46	Seattle-----	1. 63
New York-----	1. 53	Toledo-----	1. 66
Philadelphia -----	1. 82		

Working conditions for coremakers vary greatly among individual foundries. In some, conditions compare favorably with metalworking industries generally; in others, safety and comfort are below the average for metalworking. The injury rate in foundries tends to be relatively high, although there has been considerable improvement of working conditions in recent years. Coremaking, how-

ever, is somewhat safer than foundry work generally.

Like other foundry workers, the large majority of hand coremakers are union members. The principal labor organizations covering these workers include the International Molders and Foundry Workers Union of North America (AFL), the United Steelworkers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

See also Machine Coremakers, page 257, and Hand Molders, page 251.

## Machine Coremakers

(D.O.T. 6-82.010, .020, and .030)

### *Outlook Summary*

Employment in this occupation is expected to increase slightly during the next few years. Over the longer run a fairly stable employment level is anticipated.

### *Nature of Work*

Machine coremakers are foundry workers who operate one of several different types of machines which force prepared sand into specially shaped hollow forms to make sand cores. These cores are then used together with sand molds in casting metal. The duties and the amount of skill required for machine coremakers vary. Some workers are required to set up and adjust their own machines and do any necessary finishing operations on the cores; less-skilled coremakers are more closely supervised, and the necessary adjusting of the machines is done for them.

### *Where Employed*

Machine coremakers are employed mainly in production foundries, where large quantities of identical castings are made for use in such finished products as automobiles, agricultural machinery, and household appliances. Most of these production foundries are departments of the company which uses the castings, but some are independent foundries producing castings for sale. Although

foundries tend to specialize in casting one or two metals—gray iron, steel, malleable iron, brass, bronze, aluminum, or magnesium—machine coremakers can usually transfer, with little or no extra training, from one type of foundry to another.

Most of the jobs for machine coremakers are in the midwestern and northeastern sections of the country, with Ohio, Pennsylvania, Illinois, Michigan, Indiana, and New York the leading States.

### *Training and Qualifications*

In general, for the less-skilled machine-core-maker jobs only a brief period of on-the-job training is needed, and no special form of preparation is required. Persons without previous foundry experience may be hired directly, or foundry laborers or helpers may be upgraded to this work. However, a 3- or 4-year coremaker apprenticeship, or equivalent training, is sometimes needed for the more difficult and responsible machine-coremaking jobs.

For many types of machine coremaking little physical strength is needed, and some women are employed. In a number of foundries the occupation is open to Negro workers.

### *Outlook*

During the next few years, a moderate increase in the number of jobs for machine coremakers is anticipated. Expanding output in such industries

as automobiles, electrical equipment, farm machinery, and railroad equipment, which are among the major users of castings, should keep foundry employment at a peacetime high. There will also be job opportunities for a number of new workers to replace experienced machine coremakers who leave the foundries for other fields of work, or to replace those who die or retire. However, because machine coremaking is a relatively small occupation, the total number of new job openings will be limited.

Over the longer run, the employment of machine coremakers should be relatively stable. The trend toward wider use of coremaking machines will tend to offset the slight decline in total foundry activity likely to occur when the unsatisfied demands for many metal products using castings have been met.

### *Working Conditions*

Working conditions vary greatly among individual foundries. In some, conditions compare favorably with metalworking industries generally; in others, safety and comfort are below the average for metalworking. The injury rate in foundries tends to be relatively high, although there has been considerable improvement of working conditions in recent years.

Like other foundry workers, the large majority of machine coremakers are union members. The principal labor organizations covering these workers include the International Molders and Foundry Workers Union of North America (AFL), the United Steelworkers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

*See also* Hand Coremakers, page 255, and Machine Molders, page 253.

## Patternmakers

(D.O.T. 5-17.010 and .020)

### *Outlook Summary*

There will be opportunities each year for a small number of persons to enter this highly skilled occupation, with good prospects for continued employment over the longer run.

### *Nature of Work*

Patternmakers are the highly skilled craftsmen who construct patterns and core boxes for castings. They are classified, primarily, according to the kind of material they use in making patterns. Those who construct wooden patterns constitute about two-thirds of the total. Of the remainder, most are metal patternmakers, although there are a few who work with other materials, such as plaster.

To do his job properly, a patternmaker must understand general foundry practice. He works from blueprints and plans the pattern, taking into account the manner in which the object will be cast and the type of metal to be used. The wood patternmaker selects the appropriate wood stock and lays out the pattern, marking the design for each section on the proper piece of wood. Using

power saws, he cuts each piece of wood roughly to width and length. He then shapes the rough pieces into their final form, using various wood-working machines—such as borers, lathes, planers, band saws, and sanders—as well as many small hand tools. Finally, he assembles the pattern segments by hand.

The duties of a metal patternmaker differ from those of a wood patternmaker principally in that metal and metalworking equipment are substituted for wood and woodworking equipment. Metal patternmakers prepare patterns from metal stock, or, more commonly, from rough castings made from an original wood pattern. To shape and finish their work, they use a variety of metalworking machines, including the engine lathe, drill press, milling machine, power hacksaw, grinder, and shaper. Apart from these differences, metal patternmaking is similar to work on wood patterns, requiring blueprint reading and lay-out.

Throughout his work the patternmaker carefully checks each dimension of the pattern. A high degree of accuracy is required, since any imperfection in the pattern will be reproduced in the castings made from it. Other duties of pattern-



makers include making core boxes (in much the same manner as patterns are constructed) and repairing patterns and core boxes.

#### *Where Employed*

Patternmaking is done in specially equipped pattern shops, which are of two types—*independent* and *integrated*. *Independent* pattern shops are separate establishments which make patterns for sale. An *integrated* (or *corporation*) shop may be operated in conjunction with a foundry which uses the patterns. On the other hand, it may be the pattern department of a plant that buys castings from a commercial foundry, to which it supplies appropriate patterns with each new order for castings.

Patternmaking jobs are found mainly in the industrial centers of the Midwest and Northeast, with Michigan, Ohio, Illinois, Pennsylvania, and New York the leading States.

#### *Training and Qualifications*

Apprenticeship, or a similar program of on-the-job training, is the principal means of qualifying as a journeyman patternmaker. Because of the high degree of skill and the wide range of knowledge needed for patternmaking, it is very difficult to obtain the necessary training through informally picking up the trade. Good trade school courses in patternmaking provide useful preparation for the prospective apprentice, and may in some cases be credited toward completion of the apprentice period. However, these courses do not substitute for apprenticeship or other on-the-job training.

The usual apprenticeship period for patternmaking is 5 years, or about 10,000 working hours. In addition, at least 720 hours of classroom instruction in related technical subjects is normally provided during apprenticeship. Since wood and metal patternmaking differ in certain essential respects, there are separate apprenticeships for each type.

Patternmaking, although not strenuous, requires considerable standing and moving about. A high degree of manual dexterity is especially important because of the precise nature of many hand operations. To all practical purposes, this is entirely a man's occupation.

#### *Outlook*

It is expected that the number of jobs for patternmakers will remain around its present level of about 16,000 during the next few years. Continued high production in the industries which are among the main users of castings, such as automobiles, plumbing and heating equipment, household appliances, and farm machinery, is expected to keep foundry activity at a peacetime high, thus providing many jobs for patternmakers.

There will be few apprentice openings in the next year or two because of the large number of apprentices taken on since the war, but when these men complete their training there will be a small number of openings each year.

After several years of high employment, the number of patternmaker jobs will decline, slightly reflecting the general downward trend in foundry activity that may be expected after the accumulated demand for many metal products has been met. In addition, employment may tend to be reduced somewhat by such technological changes as some substitution of welding and other fabricating methods in place of casting. However, not many experienced patternmakers should be unemployed, and those who begin training during the next few years, have good prospects for continued employment over a period of many years. The gradual dropping out of older men in the trade will tend to offset the decline in employment, so that the remaining workers will probably continue to have jobs.

#### *Earnings and Working Conditions*

Patternmaking is among the highest paid occupations in manufacturing. In August 1947, union patternmakers in such large centers as Chicago, Cleveland, and Detroit generally earned upward of \$2 an hour straight time, and some made as much as \$3.50 an hour.

Experienced patternmakers may be advanced to pattern lay-out man or pattern room foreman. In some cases, a journeyman may have the opportunity to start a small pattern shop of his own. When patternmaking employment is not available, journeymen patternmakers can find jobs in related fields. Wood patternmakers can qualify for nearly every kind of skilled woodworking

job—cabinetmaking, for example. Metal patternmakers are suited for many types of machine shop work, including the jobs of machinist, machine tool operator, and lay-out man.

The great majority of patternmakers are mem-

bers of the Pattern Makers' League of North America (AFL). A small number have been organized by industrial unions of the CIO, particularly the United Automobile, Aircraft, and Agricultural Implement Workers of America.

## Chippers and Grinders (Foundry)

(D.O.T. 6-82.910)

### *Outlook Summary*

There will be numerous openings for new workers during the next few years; employment prospects in the longer run are less favorable.

### *Nature of Work*

Chippers and grinders constitute a large group of workers, most of them semiskilled, in the cleaning and finishing departments of foundries. Chipping consists of removing the excess metal from castings by means of pneumatic hammers or hand hammers and chisels. In grinding, a mechanically powered abrasive wheel is used to smooth and finish castings. Although chipping and grinding may be separate occupations they are often combined in one job, especially in the smaller foundries. There are variations in skill requirements, depending on the intricacy of the castings on which work is done, the degree of precision required, and the amount of supervision given the worker.

### *Where Employed*

Chippers and grinders are employed in both independent foundries, which produce castings for sale to other firms, and in foundry departments of plants which use castings in the manufacture of such products as automobiles, farm machinery, various types of industrial equipment, household appliances, and railroad equipment. Although foundries tend to specialize in casting one or two metals—gray iron, steel, malleable iron, brass, bronze, aluminum, or magnesium—chippers and grinders usually can transfer, with little or no extra training, from one type of foundry to another.

Most of the jobs for chippers and grinders are in the midwestern and northeastern sections, with

Ohio, Pennsylvania, Illinois, Michigan, Indiana, and New York the leading States.

### *Training and Qualifications*

The basic duties of the chipper or grinder are generally learned in a brief period of on-the-job training, and no special form of preparation is needed. Persons without previous foundry experience may be hired directly, or foundry laborers may be upgraded to this work. Considerable experience in chipping and grinding is required, however, to qualify for the more intricate, precise, and responsible duties.

In many respects chipping and grinding involve strenuous work, and at least average strength is needed. Consequently, relatively few women are employed in this occupation, and these only for work on small castings. In most foundries, these jobs are open to Negro workers.

### *Outlook*

The number of jobs for chippers and grinders is expected to rise slightly above the present level of about 40,000 during the next few years. Expanding output in such industries as automobiles, electrical equipment, farm machinery, and railroad equipment, which are among the major users of castings, should keep foundry employment at a peacetime high. There will also be many job opportunities for new workers to replace experienced chippers and grinders who leave the foundries for other fields of work, or who die or retire.

Over the longer run, employment of chippers and grinders, along with foundry employment generally, is expected to drop off somewhat as the backlog of demand for many metal products is satisfied and the requirements for castings are thus reduced. The growing use of permanent-mold



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Grinders use mechanically powered abrasive wheels to smooth and finish castings.

and grinders in independent ferrous foundries in selected large cities in November 1947 are shown below:

Baltimore	..... \$1. 00	Los Angeles	..... \$1. 23
Birmingham	..... . 86	Milwaukee	..... 1. 56
Boston	..... 1. 04	Minneapolis-St. Paul	1. 16
Buffalo	..... 1. 58	Newark	..... 1. 04
Chicago	..... 1. 42	New York	..... 1. 15
Cincinnati	..... 1. 15	Philadelphia	..... 1. 48
Cleveland	..... 1. 42	Pittsburgh	..... 1. 35
Denver	..... 1. 05	Portland (Oreg.)	1. 39
Detroit	..... 1. 66	San Francisco	..... 1. 33
Hartford (Conn.)	1. 14	Seattle	..... 1. 34
Houston	..... 1. 01	Toledo	..... 1. 42
Indianapolis	..... 1. 27		

Working conditions vary greatly among individual foundries. In some, conditions compare favorably with metalworking industries generally; in others, safety and comfort are below the average for metalworking. The injury rate in foundries tends to be relatively high, although there has been considerable improvement of working conditions in recent years. Chipping and grinding tend to have higher-accident rates than many other kinds of foundry work.

Like other foundry workers, the large majority of chippers and grinders are union members. The principal labor organizations covering these workers include the International Molders and Foundry Workers Union of North America (AFL), the United Steelworkers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

*See also* Castings Inspectors.

casting, and other methods which decrease the amount of finishing needed, plus increased installation of materials handling equipment, will tend further to lower the number of jobs for chippers and grinders. However, there should be little unemployment of experienced workers, although the number of openings for beginners will be diminished considerably.

### *Earnings and Working Conditions*

Earnings of chippers and grinders vary widely. Many are paid on an incentive basis. Average straight-time hourly earnings of male chippers

## Castings Inspectors

(D.O.T. 6-82.920)

### *Outlook Summary*

In the next several years, there will be some openings for new workers in this occupation. Longer run prospects are for continued employment of experienced inspectors.

### *Nature of Work*

Castings inspectors are foundry workers who check finished castings for structural soundness and proper dimensions. The more skilled inspec-

tors are able to read blueprints, to work on widely different types of castings, and to mark partially defective castings to show what should be done to salvage them. The less skilled do routine measuring and checking of large numbers of identical castings under close supervision.

### *Where Employed*

Castings inspectors are employed in both independent foundries, which produce castings for sale

to other firms, and in foundry departments of plants which use castings in the manufacture of such products as automobiles, farm machinery, various types of industrial equipment, household appliances, and railroad equipment. Although foundries tend to specialize in casting one or two metals—gray iron, steel, malleable iron, brass, bronze, aluminum, or magnesium—castings inspectors usually can transfer, with little or no extra training, from one type of foundry to another.

Most of the jobs for castings inspectors are in the midwestern and northeastern regions, with Ohio, Pennsylvania, Illinois, Michigan, Indiana, and New York the leading States.

#### *Training and Qualifications*

Skilled inspector jobs are usually filled by promotion from lower-grade inspection jobs or from other cleaning and finishing occupations, such as that of chipper and grinder. For the less skilled work, previous foundry experience may not be needed. Physical requirements depend on the size of castings inspected and the availability of mechanical handling equipment. In the lighter types of inspection work some women are employed, mainly for the less skilled jobs. Skilled inspectors may be promoted to the jobs of chief inspector or cleaning room foreman.

#### *Outlook*

The number of jobs for castings inspectors is expected to remain near its present high level of about 10,000 during the next few years. The expanding needs of many of the industries which are among the important users of foundry products should keep the Nation's foundries producing

at a very high rate. These industries include particularly automobiles, farm machinery, industrial electrical equipment, plumbing and heating supplies, and railroad equipment.

Over a longer period, the number of jobs for castings inspectors, along with foundry employment generally, may drop off somewhat, as the backlog of demand for many metal products is satisfied and the needs for castings are thus reduced. However, few, if any, experienced inspectors will be unemployed, although the number of new job openings will be reduced.

There will be some job opportunities for new workers because of replacement needs. Among the less skilled inspectors especially, experienced workers frequently shift into other lines of work, creating jobs for newcomers.

#### *Working Conditions*

Working conditions vary greatly among individual foundries. In some, conditions compare favorably with metalworking industries generally; in others, safety and comfort are below the average for metalworking. The injury rate in foundries tends to be relatively high, although there has been considerable improvement of working conditions in recent years.

Like other foundry workers, the large majority of castings inspectors are union members. The principal labor organizations, covering these workers include the International Molders and Foundry Workers Union of North America (AFL), the United Steelworkers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

*See also* Chippers and Grinders (Foundry), page 260.

## Melters (Foundry)

(D.O.T. 4-91.351, .411, .441, .447, .571, and .572)

#### *Outlook Summary*

There will be a limited number of openings for new workers in this occupation during the next few years. Long-run prospects are for a fairly stable level of employment.

#### *Nature of Work*

A foundry melter operates or directs the operation of a furnace used to melt metal for castings. He usually specializes on a particular type of furnace—cupola, open-hearth, electric, crucible, or

reverberatory—and on one or two metals. Skill requirements in this occupation depend on the way the foundry is organized and the type of melting equipment used. Skilled melters need little supervision and are responsible for charging the furnace, controlling the furnace temperature and melting time, and determining from the appearance of the molten metal when it is ready for pouring. Less skilled melters work under close supervision of a foundry manager or an engineer and need use little independent judgment.

#### *Where Employed*

Melters are employed both in independent foundries, which produce castings for sale to other firms, and in foundry departments of plants which use castings in the manufacture of such products as automobiles, farm machinery, various types of industrial equipment, household appliances, and railroad equipment.

Most of the jobs for melters are in the mid-western and northeastern regions, with Ohio, Pennsylvania, Illinois, Michigan, Indiana, and New York the leading States.

#### *Training and Qualifications*

As a rule, there are no apprenticeships or other organized training programs provided for melters. The less skilled melting jobs are learned in a brief period of informal training. The usual way to get one of the more skilled jobs is to begin as a furnace helper or less skilled melter and gradually to pick up the trade. The more skilled melters must have some familiarity with general foundry practice, shop arithmetic, and certain practical aspects of chemistry and metallurgy. Since the duties of melters are in many respects strenuous, physical requirements are fairly high and normally only men are employed.

#### *Outlook*

The number of jobs for foundry melters along with foundry employment generally is expected

to increase somewhat in the next few years because of the expanding needs of many of the major users of foundry products, including such industries as automobiles, electrical equipment, farm machinery, and railroad equipment. The long-run trend is for a fairly stable level of employment, although the growing use of more efficient melting methods may slightly reduce the number of men required. There is, moreover, a definite tendency to simplify the work of the more skilled melters by transferring some of their responsibilities to technical employees.

Job opportunities for new workers will arise mainly from replacement needs. Among the more skilled melters, particularly, there is a considerable proportion of older men who will have to be replaced within a few years. Experienced furnace helpers and less skilled melters frequently shift to other fields of work, creating openings for new workers. However, because this is a fairly small occupation, there will be only a limited number of openings in any one year.

#### *Working Conditions*

Working conditions vary greatly among individual foundries. In some, conditions compare favorably with metalworking industries generally; in others, safety and comfort are below the average for metalworking. The injury rate in foundries tends to be relatively high, although there has been considerable improvement of working conditions in recent years. Accidents in melting tend to be more frequent than in many other kinds of foundry work.

Like other foundry workers, the large majority of melters are union members. The principal labor organizations covering these workers include the International Molders and Foundry Workers Union of North America (AFL), the United Steelworkers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implementation Workers of America (CIO).

## Foundry Technicians

(D.O.T. 4-86.170)

### *Outlook Summary*

There will be good employment opportunities for a limited number of new workers in this small but growing occupation.

### *Nature of Work*

This is a group of skilled foundry occupations having to do with quality control in the making of castings. Included are workers with such specialized duties as the testing of molding and core-making sand, chemical analysis of metal, operation of machines which test the strength and hardness of castings, and the use of X-ray or magnetic apparatus to inspect the internal structure of castings.

In general, a high-school education is a prerequisite, and employers may require additional technical schooling. However, most of the foundry technician's duties are learned on the job. Physical strength is not ordinarily needed, and women are often employed. Foundry technicians may advance to supervisory positions in their various specialized fields.

Foundry technicians are employed both in independent foundries, which produce castings for sale to other firms, and in foundry departments

of plants which use castings in the manufacture of such products as automobiles, various kinds of industrial equipment, farm machinery, railroad equipment, and household appliances.

Most of the jobs for foundry technicians are in the midwestern and northeastern sections of the country, with Ohio, Pennsylvania, Illinois, Michigan, Indiana, and New York the leading States.

### *Outlook*

Employment of foundry technicians is expected to rise slightly above its present level during the next few years. The expanding needs of many industries which are major users of foundry products should result in an increase in foundry activity. These industries include particularly automobiles, power-plant equipment, farm machinery, and railroad equipment.

Over a longer period, while foundry employment generally may decline somewhat, the long-run trend toward greater use of scientific methods in casting metal gradually will lead to expanded employment of foundry technicians. However, although this is a growing occupation, it is numerically small and consequently only a limited number of openings are likely in any one year.

## *Forge-Shop Occupations*

Forge-shop work is among the smaller fields of employment in metalworking. Less than 60,000 workers currently are employed in forge-shop occupations. These are, however, among the best-paid industrial occupations and include a high proportion of skilled jobs.

Forging is used to shape metal objects that are required to withstand great stress, including, for example, automobile crankshafts and axles, locomotive wheels, and marine-engine drive shafts. Steel is the main material used, but brass and other nonferrous metals are also forged.

In general, forgings are produced in machines which pound or squeeze heated metal into the desired shape. This is similar to what is done by the old-time blacksmith, except that machine power is substituted for the blacksmith's arm, and dies for his hammer and anvil.

There are many different kinds of jobs in forge shops. The most important are those having to do with the operation of the forging hammers. These hammers usually are run by crews of 2 or more—sometimes as many as 10 or 15. Hammer operators (or hammermen) and their crews generally specialize on a particular kind of forging hammer. Drop-hammer operators use a machine which forms heated metal by impact between dies shaped like the desired object. Hammersmiths produce forgings with power hammers equipped with unshaped dies, forming metal to shape by manipulating it under the pounding of the flat dies. (Basically this is what the blacksmith does by hand.) Upsetters operate forging machines which shape metal by pressure exerted horizontally; forging-press operators use a machine similar to the upset machine, except that it operates vertically. Heaters and helpers make up the rest of the various hammer crews, assisting the hammer operators in a number of ways.

In addition to the hammer crews, forge-shop

workers include a number of men engaged in trimming, cleaning, finishing, or inspecting forgings. There are also many laborers employed, mainly in moving materials. A small number of skilled die sinkers work in the die shops, preparing the forging dies by highly accurate hand and machine operations.

The more skilled forge-shop jobs, such as that of hammerman, are filled by promoting men from lower rated forge-shop jobs. For example, a man starts as a helper on a hammer crew, advances to the job of heater, and then to hammerman. Typically, this takes several years; it can, however, sometimes be done in less than a year.

Forge-shop jobs are found in a variety of industries. The largest group is in independent steel-forging plants—those producing steel forgings for sale to other industries. Many workers, however, are employed in the forge departments of plants which use forged parts in their final products, such as automobiles, railroad equipment, aircraft, hand tools, or machinery. A number of forge-shop workers are employed in large shops operated as a part of steel mills.

Employment of forge-shop workers is concentrated mainly in the metalworking centers of the Midwest and the Northeast, with Ohio, Pennsylvania, Michigan, and Illinois among the most important States.

During the next several years there should be some increase in the number of forge-shop jobs, and new workers will be hired as helpers and laborers. Higher output is in prospect in many industries using forged parts in their final products. These industries include particularly automobiles, tractors, farm machinery, aircraft, and railroad equipment. As a result, production of forgings will probably rise somewhat over its present high level. However, although forge-shop

employment is far higher than prewar, it is still well under the wartime peak, when tremendous quantities of forgings were required for ordnance, aircraft, and ships.

Over the longer run, forge-shop employment may decline slightly as the backlogs of demand for automobiles, tractors, and other products using forgings are worked off. It is likely, however, that enough older workers will be dropping out of the shops to offset the decline in employment so that those remaining in this field will continue to have jobs, and there will also be some new openings.

Earnings in forge shops are among the highest in industry. In January 1948, production workers in independent steel forging plants earned an average of nearly \$66 for a workweek of slightly under 42 hours. (In the same month, the average for all durable goods manufacturing was slightly under \$56 for a workweek of about 41 hours). In part, the level of forge-shop earnings is accounted

for by the prevalence of incentive pay; the generally difficult working conditions are also a factor in the wage scale. Earnings in certain forge-shop occupations, such as that of hammerman, range considerably higher. Because some of these jobs require considerable speed and stamina, older men are often unable to continue in the occupation and are transferred to lower rated, less-demanding forge-shop jobs.

Forge shops are typically hot and noisy, and much of the work is strenuous. The accident frequency rates for forge shops are higher than the average for metalworking industries.

Most forge-shop workers are union members. The leading unions in this field include the International Brotherhood of Blacksmiths, Drop Forgers, and Helpers (AFL), the United Steelworkers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

## Drop-Hammer Operators

(D.O.T. 4-86.170)

### *Outlook Summary*

There will be some increase in employment during the next few years. Drop-hammer operator jobs will be filled by upgrading less-skilled forge-shop workers, creating openings for new workers at the lower-skill levels. Longer-run prospects are for continued employment of those in this field.

### *Nature of Work*

A drop-hammer operator is a skilled forge-shop worker who operates a drop hammer, a kind of forging machine which pounds metal into various shapes between closed (shaped) dies. He directs the work of the heater who heats the metal to prepare it for forging and supervises any helpers assigned to his hammer. He may direct his crew in setting up the hammer. The two principal types of drop hammers are steam and board. The operators of steam hammers are generally considered more skilled than those on board hammers and the skill required tends to increase with the size of the hammer, although this also depends upon the complexity of the object to be forged. Men can transfer from one type of hammer to another only with

an additional period of training. Because of their greater skill, steam-hammer operators can more readily transfer to board hammers than board-hammer operators to steam.

### *Where Employed*

The largest number of drop-hammer operators are employed in independent iron and steel forge shops which forge parts for other industries. Many are also employed in forge shops in factories making automobiles and machinery, and in railroad repair shops.

Jobs for drop-hammer operators are found principally in the Midwestern and Northeastern States, including Ohio, Pennsylvania, Illinois, Michigan, and New York.

### *Training and Qualifications*

Drop-hammer operation is learned on the job, but a regular apprenticeship is not ordinarily provided. Usually, a minimum of 2 to 4 years' experience in the forge shop is required. Workers usually begin as helpers and after sufficient experience advance to the job of heater. Experienced



and capable heaters are upgraded to light forging work when openings occur and then progress on to the heavier hammers as they acquire greater skill. All of the workers in this occupation are male, and considerable physical strength is required.

### *Outlook*

During the next several years there should be some increase in the number of drop-hammer operator jobs, so that less-skilled forge-shop workers will be upgraded to these jobs and new workers taken on as helpers. Higher output is in prospect in many industries using drop-forged parts in their final products. These industries include particularly automobiles, aircraft, tractors, farm machinery, and railroad equipment. As a result, production of drop forgings will probably rise somewhat over its present high level.

Over the longer run, forge-shop employment may decline slightly as the backlog of demand for automobiles, tractors, and other products using forging is worked off. However, it is likely that enough older workers will be dropping out of the occupation to offset the decline in employment, so that those remaining in this field will continue to have jobs, and there will also be some new openings.

### *Earnings and Working Conditions*

Drop-hammer operators are among the highest-paid workers in manufacturing. Recent wage

data are not available for the independent forge shops or for some of the other industries which employ drop-hammer operators. However, in October 1946, in the machinery industries (except electrical machinery, machine tools, and machine-tool accessories) average straight-time hourly earnings were as follows: Drop-hammer operators, steam, 5,000 pounds and over, \$1.91; drop-hammer operators, steam, under 5,000 pounds, \$1.72; drop-hammer operators, board, under 3,000 pounds, \$1.57. (Since October 1946, drop-hammer operators generally have received wage increases in machinery plants.)

Most drop-hammer operators are members of unions. Many belong to the International Brotherhood of Blacksmiths, Drop Forgers, and Helpers (AFL). Others have been organized by the industrial unions of the CIO, especially the United Steelworkers of America and the United Automobile, Aircraft, and Agricultural Implement Workers of America.

Forge shops are typically hot and noisy places to work. The accident frequency rates for forge shops are higher than the average for metal-working industries.

Because the work requires considerable speed and stamina, older men are often unable to continue in the occupation. These men are usually transferred to lower-rated, less-demanding forge-shop jobs.

*See also* Heaters, Forge, page 271.

## Hammersmiths

(D.O.T. 4-86.120)

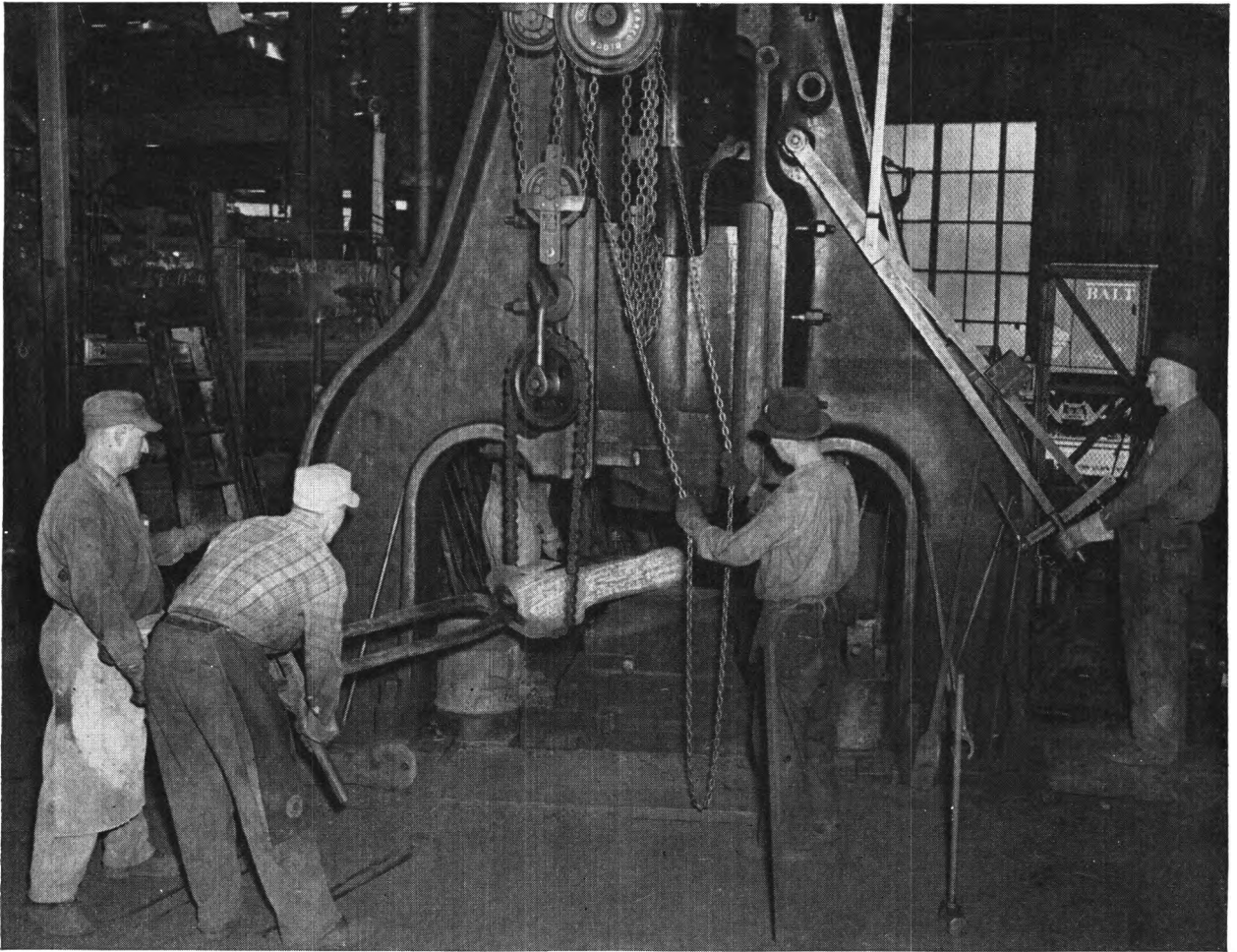
### *Outlook Summary*

There will be a few new openings for hammersmiths during the next several years. Longer run prospects are for stable employment.

### *Nature of Work*

A hammersmith is a highly skilled forge-shop worker who operates a hammer equipped with unshaped (open) dies, used to pound heated metal into required shapes. This method is employed in forging objects which are too large or intricate

for closed dies (shaped to form a particular object) or which are needed in quantities too small to justify the expense of making closed dies. The hammersmith supervises several men—for example, an assistant operator or hammer driver, a heater, and several helpers assigned to his hammer. His work is generally considered more skilled than closed-die forging. In addition to control of the hammer stroke and careful manipulation of the heated metal under the die, his job requires a knowledge of forging practice, blueprint reading, properties of metals, and shop arithmetic.



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The hammersmith supervises a crew of men.

### *Where Employed*

Hammersmiths are employed both in independent iron and steel forge shops (particularly in the smaller plants), which forge parts for sale to other industries, and in the forge departments of factories making finished products, such as heavy duty machinery. During the war, many were employed in forging large gun barrels and ship parts, such as propeller shafts.

Hammersmith jobs are found mainly in the Midwestern and Northeastern States, including Pennsylvania, Indiana, Ohio, New York, Illinois, and Wisconsin.

### *Training and Qualifications*

At least several years of forge-shop experience in lower grade jobs are required to become a ham-

mersmith. It is usual to begin as a helper. An experienced helper who shows the needed aptitudes may be promoted to the job of heater, and thence to assistant operator. Hammersmiths are selected from among the more experienced assistants. Considerable stamina is required for this work in order to do the necessary heavy lifting and to withstand the noise, heat, and vibration typical of forge shops.

### *Outlook*

Replacement of workers leaving the occupation will provide a few openings to be filled by less-skilled forge-shop workers. The number of hammersmith jobs is far below the wartime peak, when many were employed in forging ordnance and ship parts. Employment, however, is far higher than

prewar, and may rise somewhat during the next few years in response to the needs of many metalworking industries for heavy forgings. Longer run prospects are for continued employment of those entering the occupation. This is one of the smaller forge-shop occupations, so that the number of openings occurring in any one year is limited.

#### *Working Conditions*

Forge shops are typically hot and noisy places to work. The accident frequency rates for forge shops are higher than the average for metalworking industries.

Because the work requires considerable speed and stamina, older men are often unable to continue in this occupation and are usually transferred to lower-level, less-demanding forge-shop jobs.

Most hammersmiths are members of unions. Many belong to the International Brotherhood of Blacksmiths, Drop Forgers, and Helpers (AFL). Others have been organized by the industrial unions of the CIO, especially the United Steelworkers of America and the United Automobile, Aircraft, and Agricultural Implement Workers of America.

## Forging-Press Operators

(D.O.T. 4-86.125; 6-88.718)

#### *Outlook Summary*

There will be a few openings for new workers. The trend of employment is upward, so that those who do enter the occupation should continue to have jobs.

#### *Nature of Work*

These are forge-shop workers who operate forging presses, which shape metal by squeezing it in closed (shaped) dies. This method is mainly used where large quantities of relatively small forgings—either steel or nonferrous—are required. The forging-press operator may supervise a heater (who heats the metal before forging) and one or more helpers. He must know how to control the heating of the metal, to regulate the pressure of the machine, and to position the work in the dies. His duties may include setting up the press. In general, the job is less skilled than drop forging.

#### *Where Employed*

Forging-press operators are employed both in independent forge shops (which forge parts for sale to other industries) and in the forge departments of factories producing finished products, such as automobiles and farm implements. During the war, many were employed in forging aluminum parts for aircraft.

Jobs for forging-press operators are found principally in the Midwestern and Northeastern States, including Ohio, Illinois, Pennsylvania, Michigan, Connecticut, and New York.

#### *Training and Qualifications*

Forging-press operation is learned on the job. Where crews are used, workers start as helpers, advancing to heaters after getting enough experience; operators are selected from among the experienced heaters. It may take several years to advance from helper to operator. Where a single man operates the press, inexperienced men are hired as trainees. The work is strenuous and requires the ability to withstand the heat, noise, and vibration present in forge shops.

#### *Outlook*

There will be a few openings for forging-press operators in the next several years. Employment will rise somewhat because of the expanding needs for pressed forgings in many metalworking industries. Longer-run prospects are also favorable, since somewhat greater use of the press-forging method is anticipated. The resulting increase in the number of forging-press jobs combined with normal replacement needs will create opportunities for beginners. Relatively few openings are likely in any one year, however, because of the small size of the occupation.

#### *Earnings and Working Conditions*

Recent wage data for independent forge shops and for many of the other industries which employ forging-press operators are not available. However, in October 1946, hydraulic forging-press

operators (vertical) averaged \$1.33 an hour straight time in forge shops in the machinery industries (except electrical machinery, machine tools, and machine-tool accessories). Since then, forging-press operators have received wage increases in many machinery plants.

Most forging-press operators are members of unions. Many belong to the International Brotherhood of Blacksmiths, Drop Forgers, and

Helpers (AFL). Others have been organized by the industrial unions of the CIO, especially the United Steelworkers of America and the United Automobile, Aircraft, and Agricultural Implement Workers of America.

Forge shops are typically hot and noisy places in which to work. The accident frequency rate for forge shops is higher than the average for metalworking industries.

## Upsetters (Forging)

(D.O.T. 4-86.125)

### *Outlook Summary*

During the next few years there will be a small number of openings to be filled by less skilled forge-shop workers; over the longer run, employment will tend to rise slightly.

### *Nature of Work*

The upsetter in forge shops operates an upsetter forging machine, used to form metal between closed dies (shaped to make a particular object) which move horizontally, pressing the metal along its greatest length. This action causes the metal to spread along its other dimensions, until it takes on the required form. The upsetter directs a small crew, consisting of a heater (who heats the metal preparatory to forging) and helpers assigned to his machine. He must know how to control the heating operation, to adjust the machine's pressure on the metal, and to position the metal stock between the dies. In general, the larger the object forged, the greater the skill required.

### *Where Employed*

Most upsetters are employed in independent iron and steel forging shops, which sell forged parts to other industries. Some work in the forge departments of plants making finished products, such as automobiles and machinery.

Jobs for upsetters are concentrated in the Midwestern and Northeastern States, including Ohio, Pennsylvania, Illinois, Indiana, Wisconsin, Michigan, and New York.

### *Training and Qualifications*

Several years' work experience is generally needed to learn upset forging. It is usual to begin as a helper, and after sufficient experience to rise to the job of heater. Experienced heaters are selected for upsetter jobs on light work. With further experience they may progress to the heavier forging work. Considerable physical strength and endurance are needed in order to do the required heavy lifting and to withstand heat, noise, and vibration. Only men are employed in this occupation.

### *Outlook*

There will be a few openings for upsetters in the next several years. The jobs will be filled by upgrading less skilled forge-shop workers, new workers being taken on as helpers. Employment of upsetters will rise somewhat because of the expanding needs for upset forgings in many metalworking industries, such as automobiles and aircraft. Longer-run prospects are also favorable, since somewhat greater use of this forging method is anticipated. The resulting increase in the number of these jobs, combined with normal replacement needs, will create opportunities for beginners. Relatively few openings are likely in any one year, however, because of the small size of the occupation.

### *Working Conditions*

Most upsetting machine operators are members of unions. Many belong to the International

Brotherhood of Blacksmiths, Drop Forgers, and Helpers (AFL). Others have been organized by the industrial unions of the CIO, especially the United Steelworkers of America and the United Automobile, Aircraft, and Agricultural Imple-

ment Workers of America.

Forge shops are typically hot and noisy places to work. The accident-frequency rates for forge shops are higher than the average for metalworking industries.

## Heaters, Forge

(D.O.T. 6-88.732)

### *Outlook Summary*

Higher employment is in prospect for the next few years, with openings occurring for experienced forge-shop helpers. Those entering the occupation will have good chance for employment over the longer run.

### *Nature of Work*

The forge heater prepares metal shapes for forging by heating the metal pieces in a furnace. His duties include operating the furnace and feeding fuel to it, controlling the temperature, placing the metal shapes in the furnace, taking them out when properly heated, and transferring them to the forging machine. Many heaters work in independent shops producing forgings for use in further fabrication by other companies. Heaters are also employed in forge shops of plants making automobiles and parts, in machinery plants, and in railroad repair shops.

Experienced heaters are in line for promotion to higher-rated jobs on the hammer crews.

Jobs for heaters are found principally in the Midwestern and Northeastern States, including Ohio, Pennsylvania, Illinois, Michigan, and New York.

### *Training and Qualifications*

Heaters learn their jobs by working as helpers on various kinds of forging hammers. When a vacancy occurs, experienced and qualified helpers are upgraded to the job of heater. A growing number of shops are requiring heaters to have some technical knowledge of metallurgy. Considerable physical strength may be required.

### *Outlook*

During the next several years there should be some increase in the number of jobs for forge heaters. Higher output is in prospect in many industries using forged parts in their final products. These industries include particularly automobiles, aircraft, tractors, farm machinery, and railroad equipment. As a result, production of forgings will probably rise somewhat over its present high level.

Over the longer run, forge-shop employment will decline somewhat as the backlog of demand for automobiles, tractors, and other products using forgings is worked off. However, it is likely that enough older workers will be dropping out of forge-shop work to offset the decline in employment, so that those remaining in this field will continue to have jobs, and there will also be some new openings. However, not many openings are likely in any one year, because of the small size of this occupation.

### *Earnings and Working Conditions*

Recent wage data for independent forge shops and for many of the other industries which employ forge heaters are not available. However, in October 1946, light-work forge heaters averaged \$1.31 an hour straight time, and heavy-work forge heaters averaged \$1.55 straight time in forge shops in the machinery industries (except electrical machinery and machine-tool accessories). Since then forge heaters generally have received wage increases in machinery plants.

Most forge heaters are members of unions. Many belong to the International Brotherhood of Blacksmiths, Drop Forgers and Helpers (AFL); others have been organized by the industrial unions of the CIO, especially the United Steel Workers of America and the United Automobile, Aircraft, and Agricultural Implement Workers of America.

Forge shops are typically hot and noisy places in which to work. The accident-frequency rate for forge shops is higher than the average for metalworking industries.

*See also:* Drop-hammer Operators, page 266; Hammersmiths, page 267; Forging-Press Operators, page 269; and Upsetters, page 270.

# *Other Metalworking Occupations*

## **Assemblers, Bench (Machinery Manufacturing)**

(D.O.T. 4-75.120; 6-78.632)

### *Outlook Summary*

Prospects are that the number of jobs will remain at its present high level during the next few years. Over the longer run, replacement needs will continue to provide many openings for new workers even though total employment in this occupation may drop off somewhat.

### *Nature of Work*

These workers fit together and assemble machinery parts into complete units or subassemblies while working at a bench. The more skilled assemblers (often called bench machinists) assemble the more complex machinery parts with great precision and with little or no supervision. They must know how to read blueprints and to use precision measuring instruments and various hand and power tools, such as scrapers, chisels, files, and drill presses. The less skilled assemblers do repetitive assembling operations under supervision and are generally not responsible for the final assembling of complex jobs.

### *Where Employed*

Bench assemblers are employed in a wide variety of machinery plants, including those which make machine tools, agricultural machinery, internal-combustion engines, and textile machinery.

Bench assemblers work in machinery plants throughout the country. However, most of the jobs for these workers are concentrated in the machinery-manufacturing centers of the Midwest and Northeast, particularly in Ohio, Illinois, Pennsylvania, Michigan, and New York.

### *Training and Qualifications*

For the more skilled bench-assembling jobs, machine-shop workers, such as machinists, are

usually employed. Inexperienced workers may be hired as trainees or helpers and trained on the job to do the less skilled bench assembling.

Bench assemblers usually specialize on one type of machinery or equipment. Often they cannot readily transfer to bench assembly of other products, or even of similar products in other plants, without additional training.

The work is relatively light, and many women are employed to do the less skilled assembling jobs.

### *Outlook*

The number of jobs for bench assemblers is expected to remain at its present high level during the next few years, with many job opportunities opening up for new workers. Currently, the machinery industries are producing at the highest rate ever achieved in peacetime, with many machinery plants, such as those making tractors, farm machinery, construction equipment, and oil-field machinery, having large backlogs of orders. High employment in the machinery industries as a whole is likely to be maintained during the next few years.

After a few years, as production in many machinery plants catches up with unsatisfied demands, the number of jobs for assemblers along with machinery employment generally will tend to drop off somewhat, but should remain at a relatively high level as long as general business conditions remain good.

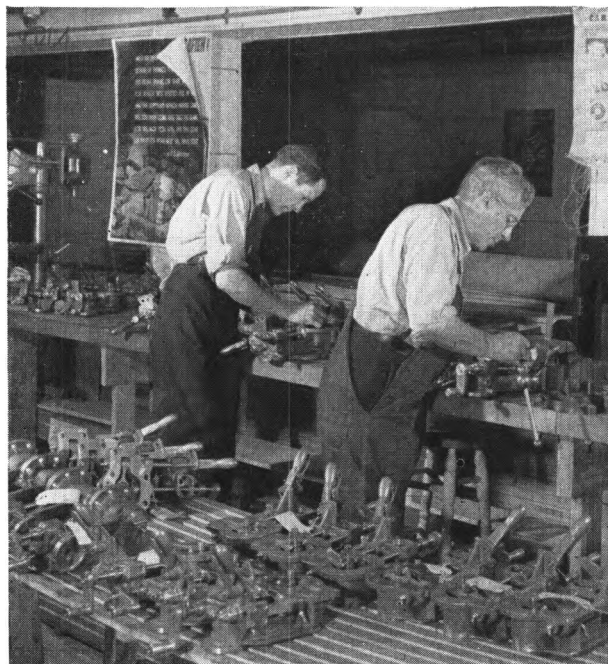
Among the skilled bench assemblers are a number of workers nearing the age when death or retirement will take them from the labor force. Replacement of these workers will provide a number of openings for new employees each year. Shifting into other occupations is common among the less skilled assemblers, and many job opportunities will be created in this way.

*Earnings and Working Conditions*

Earnings of bench assemblers vary widely, depending on their skill grade, the type of product assembled, the size and location of the plant in which they are employed, and whether they are paid on an incentive basis. Average straight-time hourly earnings of male assemblers (including both bench and floor assemblers) in machinery plants in November 1947 are shown below for selected large cities.

	Class A	Class B	Class C
Atlanta.....	\$1. 34	\$1. 07	\$0. 89
Baltimore.....	1. 28	1. 14	. 98
Birmingham.....	1. 42	1. 24	1. 16
Boston.....	1. 36	1. 21	1. 00
Buffalo.....	1. 45	1. 22	1. 09
Charlotte.....	1. 16	1. 02	. 80
Chattanooga.....	1. 44	1. 09	. 93
Chicago-Gary.....	1. 56	1. 37	1. 24
Cincinnati.....	1. 32	1. 17	1. 01
Cleveland.....	1. 67	1. 61	1. 26
Dallas.....	1. 19	1. 02	. 92
Denver.....	1. 56	1. 14	-----
Detroit.....	1. 66	1. 58	1. 38
Hartford.....	1. 40	1. 21	1. 10
Houston.....	1. 46	1. 30	1. 16
Indianapolis.....	1. 38	1. 26	1. 45
Los Angeles.....	1. 48	1. 34	1. 13
Milwaukee.....	1. 68	1. 42	1. 44
Minneapolis-St. Paul.....	1. 38	1. 32	1. 02
Newark-Jersey City.....	1. 53	1. 33	1. 11
New York City.....	1. 53	1. 37	1. 11
Philadelphia.....	1. 43	1. 26	1. 11
Pittsburgh.....	1. 41	1. 58	1. 39
Portland, Oreg.....	1. 60	1. 45	-----
Providence.....	1. 29	1. 14	1. 03
St. Louis.....	1. 53	1. 28	1. 10
San Francisco.....	1. 55	1. 38	1. 21
Seattle.....	1. 65	1. 45	1. 27
Syracuse.....	1. 69	1. 46	1. 39
Tulsa.....	1. 23	1. 07	. 90
Waterbury.....	1. 44	1. 32	1. 23

Most bench assemblers are members of unions. There are several labor organizations in the field, among the most important of which are the International Association of Machinists (Ind.), the United Electrical, Radio and Machine Workers of America (CIO), and the United Automobile, Air-



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Bench assemblers fit together and assemble small machinery parts into complete units or subassemblies.

craft, and Agricultural Implement Workers of America (CIO).

Working conditions for bench assemblers are usually good compared with factory work in general. Their places of work, generally, are relatively clean, well-lighted, and free from dust.

*See also* Floor Assemblers (Machinery Manufacturing), page 275; and All-Round Machinists, page 234.



## Assemblers, Floor (Machinery Manufacturing)

(D.O.T. 6-78.632)

### *Outlook Summary*

Employment in this occupation is expected to remain at the present high level during the next few years. Over the longer run, the number of jobs will drop off somewhat, but replacement needs will continue to provide numerous openings for new workers.

### *Nature of Work*

These workers assemble heavy machinery or equipment on shop floors, fitting and finishing machined parts with hand and power tools and fastening parts together with bolts, screws, or rivets. The more skilled assemblers put together finished machines and equipment of a complex nature, with little or no supervision. They must know how to read blueprints and use various hand and power tools. The less skilled assemblers do repetitive assembling operations under close supervision and are generally not responsible for the final assembly of complex jobs.

### *Where Employed*

Floor assemblers are employed in a wide variety of machinery plants, including those which make machine tools, tractors, construction machinery, and internal-combustion engines.

Floor assemblers work in machinery plants throughout the country, with most of the jobs concentrated in the Midwest and Northeast, particularly in Ohio, Illinois, Pennsylvania, and New York.

### *Training and Qualifications*

For the more skilled floor assembling jobs, machine-shop workers such as machinists are usually employed. Inexperienced workers may be hired as trainees or helpers and trained on the job to do less skilled floor assembly.

Floor assemblers usually specialize on one type of machinery or equipment. Often they cannot readily transfer to assembly of other products, or

even of similar products in other plants, without additional training.

### *Outlook*

The number of jobs for floor assemblers is expected to remain around its present high level during the next few years, with many job opportunities opening up for new workers. Currently, the machinery industries are producing at the highest rate ever achieved in peacetime, with many machinery plants, such as those making tractors, farm machinery, construction equipment, and oil-field machinery, having large backlogs of orders. High employment in the machinery industries as a whole is likely to be maintained during the next few years.

After a few years, as production in many machinery plants catches up with unsatisfied demands, the number of jobs for assemblers, along with machinery employment generally, will tend to drop off somewhat, but should remain at a relatively high level as long as general business conditions remain good.

Among the skilled floor assemblers are a number of workers nearing the age when death or retirement will take them from the labor force. Replacement of these workers will provide a number of openings for new employees each year. Shifting into other occupations is common among the less-skilled assemblers, and many job opportunities will be created this way.

### *Earnings and Working Conditions*

Earnings of floor assemblers vary widely, depending on their skill grade, the type of product assembled, the size and location of the plant in which they are employed, and whether they are paid on an incentive basis. Average straight-time hourly earnings of male assemblers (including both bench and floor assemblers) in machinery plants in November 1947 are shown in the following statement for selected large cities.

	Class A	Class B	Class C
Atlanta.....	\$1. 34	\$1. 07	\$0. 89
Baltimore.....	1. 28	1. 14	. 98
Birmingham.....	1. 42	1. 24	1. 16
Boston.....	1. 36	1. 21	1. 00
Buffalo.....	1. 45	1. 22	1. 09
Charlotte.....	1. 16	1. 02	. 80
Chattanooga.....	1. 44	1. 09	. 93
Chicago-Gary.....	1. 56	1. 37	1. 24
Cincinnati.....	1. 32	1. 17	1. 01
Cleveland.....	1. 67	1. 61	1. 26
Dallas.....	1. 19	1. 02	. 92
Denver.....	1. 56	1. 14	-----
Detroit.....	1. 66	1. 58	1. 38
Hartford.....	1. 40	1. 21	1. 10
Houston.....	1. 46	1. 30	1. 16
Indianapolis.....	1. 38	1. 26	1. 45
Los Angeles.....	1. 48	1. 34	1. 13
Milwaukee.....	1. 68	1. 42	1. 44
Minneapolis-St. Paul.....	1. 38	1. 32	1. 02
Newark-Jersey City.....	1. 53	1. 33	1. 11
New York City.....	1. 53	1. 37	1. 11
Philadelphia.....	1. 43	1. 26	1. 11
Pittsburgh.....	1. 41	1. 58	1. 39
Portland, Oreg.....	1. 60	1. 45	-----
Providence.....	1. 29	1. 14	1. 03
St. Louis.....	1. 53	1. 28	1. 10

	Class A	Class B	Class C
San Francisco.....	\$1. 55	\$1. 38	\$1. 21
Seattle.....	1. 65	1. 45	1. 27
Syracuse.....	1. 69	1. 46	1. 39
Tulsa.....	1. 23	1. 07	. 90
Waterbury.....	1. 44	1. 32	1. 23

Most floor assemblers are members of unions. There are several labor organizations in the field, among the most important of which are the International Association of Machinists (Ind.), the United Electrical, Radio and Machine Workers of America (CIO), and the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO).

Working conditions for floor assemblers are usually good compared with factory work in general. Their places of work, generally, are relatively clean, well lighted, and free from dust.

See also Bench Assemblers (Machinery Manufacturing), page 273, and All-Round Machinists, page 234.

## Inspectors, Machinery Parts

(D.O.T. 4-78.671, 6-78.671)

### Outlook Summary

Prospects are that the number of jobs for these workers will remain around its present high level during the next few years. Over the longer run, employment is expected to drop off somewhat, but replacement needs will continue to provide openings for new workers.

### Nature of Work

These workers examine metal parts which have been shaped by machine tools. They look for various defects, checking the dimensions and appearance of the parts to determine whether they meet specifications. The skilled inspectors work with little or no supervision and examine a variety of parts, often quite complex. They must be able to read blueprints and use various measuring devices, such as calipers, gages, and micrometers. Skilled inspectors usually must have a general knowledge of machining and other metalworking

processes. The less skilled inspectors inspect large numbers of identical parts under close supervision; often they use specially prepared gages and other measuring instruments which greatly simplify inspection.

### Where Employed

These inspectors are employed in a wide variety of nonelectrical machinery plants, such as those which make machine tools, tractors, mechanical power transmission equipment, and refrigerating equipment. Most of the jobs for these workers are concentrated in the industrial centers of the Midwest and Northeast, particularly in Ohio, Illinois, Pennsylvania, Michigan, and New York.

### Training and Qualifications

Skilled inspectors are obtained from the ranks of machine-tool operators and other machine-shop workers, or by upgrading less skilled inspectors.

Inexperienced workers are often hired for the less skilled jobs and taught to do repetitive inspection in a brief period of on-the-job training.

The work is not strenuous, and women are often employed as inspectors. Because of the nature of the work, good eyesight is generally required.

#### *Outlook*

The number of jobs for machinery-parts inspectors is expected to remain near its present high level during the next few years, with some openings occurring for new workers. During the war large numbers of inspectors were trained in the war industries, such as aircraft. However, most of those workers have shifted to other occupations or dropped out of the labor force, so that they will not be seeking jobs as machinery-parts inspectors. Currently, machinery industries are producing at the highest rate ever achieved in peacetime. Many machinery plants, particularly those making such products as tractors, farm machinery, oil-field equipment, and construction machinery, have large backlogs of orders, and high employment in the machinery industries as a whole is likely to be maintained for a few more years.

After a few years, as production in many machinery plants catches up with unsatisfied demands, the employment of machinery-parts inspectors will tend to drop off slightly, but should remain at a relatively high level as long as general business conditions are favorable.

Among the skilled machinery-parts inspectors are a number of workers approaching the age when death or retirement will take them out of the labor force. Replacement of these workers will provide a number of openings for new employees each year. Shifting into other occupations is common among the less skilled inspectors, and many job opportunities will be created in this way.

#### *Earnings and Working Conditions*

Average straight-time hourly earnings of male inspectors in machinery plants in November 1947,

are shown in the following statement for selected large cities.

	Class A	Class B	Class C
Atlanta.....		\$1. 05	
Baltimore.....	\$1. 43	1. 15	
Birmingham.....	1. 52		\$1. 05
Boston.....	1. 48	1. 33	1. 10
Buffalo.....	1. 53	1. 39	
Charlotte.....			
Chattanooga.....			
Chicago-Gary.....	1. 51	1. 37	
Cincinnati.....	1. 45	1. 27	1. 10
Cleveland.....	1. 57	1. 47	1. 22
Dallas.....	1. 44		
Denver.....	1. 39		
Detroit.....	1. 67	1. 57	1. 43
Hartford.....	1. 62	1. 25	1. 12
Houston.....	1. 61	1. 45	
Indianapolis.....	1. 47	1. 40	1. 16
Los Angeles.....	1. 54	1. 34	1. 22
Milwaukee.....	1. 54	1. 39	1. 21
Minneapolis-St. Paul.....	1. 45		
Newark-Jersey City.....	1. 46	1. 23	1. 04
New York City.....	1. 50	1. 34	1. 11
Philadelphia.....	1. 71	1. 38	1. 13
Pittsburgh.....	1. 64	1. 37	1. 17
Portland, Oreg.....	1. 66		
Providence.....	1. 27	1. 20	
St. Louis.....	1. 39	1. 25	1. 11
San Francisco.....	1. 61	1. 37	1. 22
Seattle.....	1. 67		
Syracuse.....	1. 36	1. 17	1. 05
Tulsa.....	1. 26	1. 03	
Waterbury.....		1. 26	1. 09

Most machinery-parts inspectors are members of unions. There are a number of labor organizations in this field, some of the more important of which are the International Association of Machinists (Ind.), the United Automobile, Aircraft, and Agricultural Implement Workers of America (CIO), and the United Electrical, Radio and Machine Workers of America (CIO).

Working conditions in the inspection departments are usually good compared with factory work in general. The working places are generally clean, well lighted, and adequately ventilated.

## Arc and Gas Welders

(D.O.T. 4-85.020, .030; 6-85.080)

### *Outlook Summary*

Employment of arc and gas welders is expected to rise somewhat during the next few years and over the longer run. For several more years, however, many of the job openings will be filled by workers who have had wartime welding experience but are now employed in other occupations.

### *Nature of work*

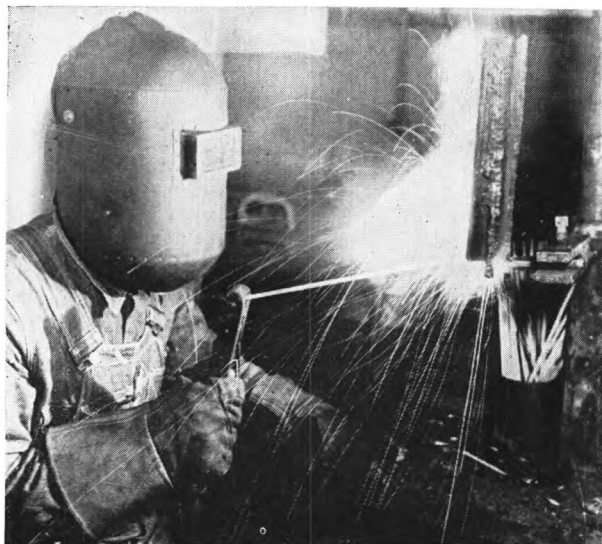
In electric arc and gas welding metal parts are joined through the application of heat intense enough to melt the edges to be joined. The welder controls the melting by properly directing the heat, whether from an electric arc or from a gas welding torch, and adds filler metal where necessary to complete the joint.

In manual (hand) arc welding, the most commonly used method, the welder "strikes" an arc by touching the metal part to be welded with an electrode and then withdrawing the electrode a short distance. The arc results when the electric circuit is broken by withdrawing the electrode, making the current jump the gap between the metal to be welded and the electrode. The welder guides the electrode along the joint to be welded, holding it at the proper arc length. The welder should know how to make different kinds of welds to weld from various positions, and to work with different metals, he should understand welding symbols.

In gas welding the welder directs the flame from a gas welding torch along the joint to be welded. The flame is usually produced by combustion of oxygen and acetylene gas. The welder must know how to light and adjust the torch for various metals and how to form the different kinds of welds.

To a considerable extent, particularly in maintenance and repair work, welding is done by members of other crafts. The boilermaker, the structural steel worker, the machinist, and the automobile mechanic, all may be required to know and perform welding in their work. Typically, how-

ever, welding, especially in production work, is done by workers who specialize in its application. No matter where he works, the skilled welder should have some practical knowledge of the fabricating and assembling operations in the field of work in which he is engaged. For example, a welder working in a shipyard should know in general how ships are put together or one employed in a boiler shop should understand how boilers are assembled. If the welder moves into a type of work in which he is not experienced, some of the



COURTESY OF NATIONAL ARCHIVES

Welders are subject to certain hazards in their work, but these can be almost entirely avoided by proper precautions.

basic practices in the new field of work must be learned.

### *Training and Qualifications*

A course in welding methods, followed by extensive job experience, has been the common way for skilled welders to receive their training. Formal apprenticeships in welding alone are not often found. Frequently, welders doing the simpler repetitive types of work are trained on the job, without any special instruction, in 6 months or less. To acquire a broader knowledge of welding, regu-

lar course instruction in welding is desirable, either in public or private vocational schools or in courses conducted by industrial firms to train their workers. Before enrolling in a private school, the prospective student should check with the local educational authorities about the quality of the instructions offered. The American Welding Society has issued codes of recommended standards for welding courses which provide for a minimum of 150 hours of actual welding practice under qualified instructors and not less than 20 hours of class instruction in welding theory. Experience has shown that a longer learning time is usually required.

Since a poor weld may have serious consequences in the failure of the completed product when in use, welders are usually required to have passed qualification tests established by the American Welding Society. Requirements are administered by insurance companies, employers, and inspection agencies as specified by the applicable code. In addition, welders must be licensed to do certain types of construction work in some localities.

#### *Where Employed*

Since many welders are engaged in maintenance work, welding jobs are found in a wide range of industries, including all those in which metal equipment is repaired. Most jobs, however, are in production work in the metal products industries; the leading employers are those making machinery, automobiles, electrical equipment, ships, aircraft, boilers and tanks, and fabricated structural steel. Examples of places where welders are used in maintenance work are railroad shops, electric power plants, street railway systems, paper mills, foundries, and chemical plants. A large number of welders work in local repair shops that either specialize in welding or do general metal repair work. Usually these are small shops, and very often they are owned and operated by individual welders, with perhaps several employees to assist. These shops serve mainly their local communities, repairing such things as farm equipment, automobile parts, and industrial machinery, and making welded products on a subcontract basis for local manufacturing plants.

Because of their wide employment among different industries jobs for welders are found in all

sections of the country. Many of the jobs are concentrated, however, in the industrial centers in the Midwestern and Northeastern States, including Michigan, Ohio, Illinois, Pennsylvania, and New York, where the machinery, automobile, and electrical equipment plants are mainly located. Some companies often have openings in foreign countries for employment on pipe-line work and similar construction.

#### *Outlook*

During the next few years, there should be an increasing number of job openings for arc and gas welders. Many of the openings will result from the replacement of workers leaving the occupation; other openings will be created by the expected rise in the demand for welders.

The machinery, automobile, structural steel fabricating, aircraft, and boiler shop industries and the other principal employers of welders in the metalworking field are expected to maintain and in some cases increase their activity in the next few years. The aircraft industry, particularly, will hire more welders as the Government program for greatly expanded production of military aircraft gets under way. Shipbuilding, which during the war employed over half the total number of welders, is far below the wartime rate and is not expected to rise above the current low levels, unless a large scale Government sponsored shipbuilding program should be resumed.

In spite of increased employment of welders, the number of jobs in this field will be far under the wartime level. As a result, welder jobs will be filled, in many cases, by workers who have had wartime experience in welding but are now employed in other occupations. In addition, however, there should be a number of openings for new workers, since many of the wartime welders are no longer available for welding jobs.

After several years, employment of welders in many metalworking industries may decline somewhat, as the backlog of demand for certain metal products is eliminated. Offsetting this decline, however, will be the probable greater use of welding in industry generally. New uses for welding are being found, and as a result of new developments in welding, more and more types of materials can be welded. This should mean a gradual

increase in the future number of arc and gas welding jobs. The gain in employment, however, may not keep pace with the increase in amount of welding done, because as techniques become more efficient, fewer man-hours are required to do a job.

Some experienced, all-round welders may be able to establish their own welding repair and service shops. Prospects for such shops depend upon the situation in the particular community in which the shop is located. Before a new shop is opened the needs of the community and the competition to be faced should be carefully considered.

### *Earnings and Working Conditions*

Recent information is not available on earnings of welders in most of the industries which employ them. Average straight-time hourly earnings of male hand welders in machinery plants in November 1947, are shown below for selected large cities.

	Class A	Class B
Atlanta.....	\$1. 35	\$1. 16
Baltimore.....	1. 39	1. 16
Birmingham.....	1. 30	-----
Boston.....	1. 38	1. 17
Buffalo.....	1. 52	1. 30
Charlotte.....	-----	-----
Chattanooga.....	1. 60	-----
Chicago-Gary.....	1. 61	1. 37
Cincinnati.....	1. 39	1. 33
Cleveland.....	1. 73	1. 67
Dallas.....	1. 25	1. 11
Denver.....	1. 47	1. 25
Detroit.....	1. 78	1. 56
Hartford.....	1. 53	-----
Houston.....	1. 63	1. 50
Indianapolis.....	1. 41	1. 41

	Class A	Class B
Los Angeles.....	\$1. 57	\$1. 51
Milwaukee.....	1. 75	1. 69
Minneapolis-St. Paul.....	1. 43	1. 31
Newark-Jersey City.....	1. 52	1. 35
New York City.....	1. 52	1. 36
Philadelphia.....	1. 60	1. 43
Pittsburgh.....	1. 41	1. 30
Portland, Oreg.....	1. 58	-----
Providence.....	1. 46	-----
St. Louis.....	1. 43	1. 11
San Francisco.....	1. 68	-----
Seattle.....	1. 63	1. 60
Syracuse.....	1. 51	1. 73
Tulsa.....	1. 33	1. 17
Waterbury.....	-----	1. 32

Welders are subject to certain hazards in their work, but these can be almost entirely avoided by proper precautions. Without such precautions are welders may be exposed to minor skin burns and eye injuries and to electric shock. Similarly, gas welders are subject to the possibility of explosion and fire and, when welding is done in confined spaces, poisonous fumes or gas may be present. However, these hazards can be largely eliminated by training in safety methods and by the use of proper equipment such as goggles and ventilating devices.

### *Where To Get Additional Information*

Employment Opportunities for Welders. Bulletin No. 844. United States Bureau of Labor Statistics, 1945. 19 pages. 10 cents, Superintendent of Documents, Washington 25, D. C.

## Resistance Welders

(D.O.T. 6-85.010, .020, .030, .060, and .100)

### *Outlook Summary*

There will be a small increase in employment during the next several years, with gradual gains over the longer run. Some job openings will occur as a result of replacement needs in the occupation.

### *Nature of Work*

Operators of resistance welding machines join

metal parts by bringing them together under heat and pressure. The pieces of metal to be joined are pressed between two electrodes through which electric current is passing. The parts being welded offer sufficient resistance to the flow of current to create intense heat, which together with the pressure, fuses them together. The principal types of resistance welding machines are the spot, seam, projection, flash, and upset welding machines and

portable spot welding guns. The supervisor, or in some cases the operator, sets the controls of the machine for the desired electric current and pressure. The operator mainly aligns the work, starts the machine, and then removes the work when it is finished. The machines that weld automobile bodies are large and highly automatic, while smaller and less automatic machines are used to assemble such products as metal furniture.

### *Training and Qualifications*

Courses in resistance welding are not widely given. Most resistance welders learn their work on the job in a relatively short time. The length of the learning period on the job depends upon the scope of the duties of the welders. Some welders, following general directions, insert the proper electrodes and regulate and adjust the welding machine each time a different welding operation is begun. To do this a welder should learn the meaning of welding symbols, the characteristics of different metals, and how to select and install the electrodes. In most welding jobs, however, the machine is set up and adjusted for the welder, and the welding is simple and repetitive. Beginners can learn these jobs in a month or two.

### *Where Employed*

Resistance machine welders are employed almost entirely in metalworking industries, particularly in plants assembling large quantities of products made of sheet metal and intended for the final consumer rather than as equipment to be used in factories. Thus, most of the jobs are in the industries making automobiles, electrical household appliances, refrigerators, metal furniture, and similar products. Some are also employed in machinery, industrial electrical equipment, and aircraft plants. Because metalworking employment is concentrated in the Midwestern and Northeastern States, most of the jobs are located in these regions, with Michigan, Ohio, Pennsylvania, New York, and Illinois the leading States.

### *Outlook*

Employment opportunities for resistance welders depend upon prospects in metalworking indus-

tries and the extent to which resistance welding becomes more widely used. The industries which employ most of the workers in the occupation, such as the automobile and household appliance industries, have been operating at high levels during the past several years, and are expected to continue at or above these levels for at least several years more. Stepped-up production of military aircraft will also create some jobs for resistance welders. Thus, a small number of additional jobs for resistance welders is in prospect.

In recent years rapid progress has been made in improving resistance welding methods, and in spreading its use to more products. Only during the 1930's did welding become extensively used in assembling automobiles, although now it is a very important part of the process. In the long run, further gains in the use of resistance welding can be expected. The resulting rise in the employment of machine welders will be limited, however, because of a trend toward the use of more rapid and highly automatic machines. There is likely to be a good number of job openings, however, because, as is the case in many semiskilled occupations, turn-over rates are relatively high.

### *Earnings and Working Conditions*

Earnings vary considerably, depending upon the industry in which employed, degree of skill required, and method of wage payment (hourly or incentive rates). Earnings usually range somewhat below those of arc welders and skilled machine-tool operators. Average hourly earnings in July 1946 in plants manufacturing stoves and ranges were \$1.28 for male Class A and 90 cents for female Class A resistance machine welders; in October 1946, average hourly earnings in the machinery industries (excluding machine tools and accessories and electrical machinery) were \$1.37 for male Class A and \$1.25 for male Class B machine welders. In 1947 male spot welders in the metal furniture industry averaged \$1.17 an hour straight time, while female spot welders earned 90 cents an hour on the average. Women generally earn less than men and are usually employed at Class B machine welding jobs. Since 1946 there generally have been substantial increases in aver-

age hourly earnings in plants employing machine welders.

The hazards connected with resistance-welding work are not great, and in general the working conditions compare favorably with those in other metalworking operations.

#### *Where To Get Additional Information*

Employment Opportunities for Welders. Bulletin No. 844. United States Bureau of Labor Statistics, 1945. 19 pp. 10 cents, Superintendent of Documents, Washington 25, D. C.

## Acetylene Burners

(D.O.T. 6-86.215)

### *Outlook Summary*

No marked changes in employment are expected. There will be some job openings to replace workers leaving the occupation.

### *Nature of Work*

Acetylene burners use an oxyacetylene torch to cut or trim metal objects to the desired size or shape. The oxyacetylene cutting equipment generally consists of a torch into which oxygen and acetylene gas are fed from hoses connected with the gas supply. The ignited acetylene, which serves as the fuel gas, heats the metal, and jets of oxygen do the actual cutting.

Torch tips, from which the flames spout, come in various sizes, depending upon the nature of the cutting jobs. The operator prepares for the cutting job by attaching the proper torch tip for the particular job, connecting the torch to the gas hoses, and regulating the flow of gases into the torch for the desired cutting flame. He then guides the torch along previously marked lines or, following a template or pattern, cuts through the metal. In some cases he marks the lines on the metal himself, following blueprints or other instructions.

### *Training and Qualifications*

The operators of acetylene burners are semi-skilled workers. Newcomers usually learn the work in a relatively short period of on-the-job training. Experienced acetylene gas welders can easily qualify for jobs as burners, if they should desire, since theirs is a more skilled job and covers all the things that the burner has to know.

### *Where Employed*

Acetylene burners are generally employed in plants whose operations include cutting steel plates to size, removing metal from castings, trimming rough steel shapes, and cutting up scrap metal. Among the principal employers of acetylene burners are the shipbuilding, steel works and rolling mills, machinery, fabricated structural steel, and boiler shop industries. Many are also employed by firms that prepare and sell scrap metal to be re-used in steel mills and foundries.

### *Outlook*

During the next few years, employment of acetylene burners is not expected to increase significantly. There will be some openings in this relatively small field, however, to replace workers who change to other jobs. Over the longer run, employment in the occupation should remain at around current levels. A substantial revival of shipbuilding would open up some additional jobs. Increased use of flame cutting machines in place of hand torches will hold down increases in employment of burners, even when metalworking activity is expanding. If at any time during the next 3 to 5 years or so general employment should drop substantially and jobs become hard to get, many of the experienced burners from among the thousands laid off from shipyards at the end of the war may again seek jobs as burners. If this should happen, employers would be likely to choose them over inexperienced applicants to fill any job openings for burners.

*See also* Arc and Gas Welders, page 278.



## Boilermakers

(D.O.T. 4-83.100)

### *Outlook Summary*

Long run prospects are for a gradual decline in the number of jobs for all-round boilermakers, but experienced workers will continue to have jobs.

### *Nature of Work*

All-round boilermakers fabricate, assemble, and repair boilers, tanks, vats, smoke stacks, and similar products made of heavy steel plate. Their work involves such duties as planning and laying out work from blueprints or specifications; cutting plate to size and shape with power shears or acetylene burners; shaping plates on power presses; assembling parts by bolting, riveting, or welding; and calking seams and rivet heads. Many men qualified as all-round boilermakers, however, specialize in a simple boiler-shop function, such as welding. Some of the most skilled boilermakers do only lay-out work—marking the steel plates to show other workers where the metal is to be sheared, welded, bent, or otherwise fabricated.

### *Where Employed*

Boilermakers are employed in railroad repair shops, construction projects, and boiler repair shops throughout the country; in power boiler manufacturing plants concentrated in the Great Lakes, Middle Atlantic, and Pacific coast areas; in coastal shipyards; and in the oil-refining areas of Texas, California, Pennsylvania, and other States.

### *Training and Qualifications*

To become an all-round boilermaker, a 4-year apprenticeship or equivalent on-the-job training is required. Welders, helpers, and other boiler-shop workers sometimes have the opportunity to learn the trade without serving an apprenticeship. Much of the boilermaker's work is fairly strenuous and at least average physical strength is needed.

### *Outlook*

Currently, the number of boilermaker jobs is considerably higher than prewar when less than 30,000 were employed, but under the wartime peak

when many boilermakers were working in shipyards. However, many of these wartime workers had been quickly trained in some part of boiler-making and were not all-round workers. A number of these less skilled men went into other lines of work after being released from the shipyards.

During the next several years electric power plants, oil refineries, chemical plants, and other industries using boiler-shop products are expected to expand their production facilities greatly, putting up new plants and installing new equipment. This will mean continued high employment of experienced boilermakers and some openings for new workers. In addition, any revival of shipbuilding activity, resulting from the Government's defense program, will create jobs for boilermakers.

Over a longer period a gradual decline in the number of jobs for all-round boilermakers is in prospect. In railroad shops, which have a large proportion of boilermaker jobs, the long-run trend is for reduced employment of boilermakers because of the increasing use of Diesel and electrical locomotives in place of steam locomotives. (Few boilermakers are used in the construction and repair of Diesel and electrical locomotives.) There also has been a growing tendency in boiler-making operations generally to utilize specialized workers, such as welders, thereby reducing the need for all-round boilermakers. Experienced men, however, are not likely to be unemployed, since men qualified as all-round boilermakers are definitely preferred for specialized boiler-making jobs by most employers. Moreover, a high proportion of boilermakers are older men who will be dropping out of the labor force; thus replacement needs may offset any decline in employment, so that the younger men will continue to have jobs.

### *Earnings and Working Conditions*

Earnings of boilermakers vary among the industries in which they are employed. In September 1947, straight-time earnings of boilermakers working for steam railroads averaged about \$1.45 an hour. In construction work, in July 1947, the average hourly wage rate of union journeyman

boilermakers in 75 cities was \$2.09. Recent wage data are not available for boilermakers employed in other industries.

Boilermaking tends to be more hazardous than most other metal-working occupations. The injury frequency rate in the boiler-shop-products industry is considerably higher than the average for manufacturing industries as a whole.

In construction there is considerable seasonal variation in employment of boilermakers; while in other fields, such as power boiler manufacturing

and railroad repair shops, employment is fairly steady throughout the year.

Boilermakers are generally unionized. A large number are members of the International Brotherhood of Boilermakers, Iron Shipbuilders and Helpers of America (AFL); others have been organized by industrial unions, such as the United Steelworkers of America (CIO) and the Industrial Union of Marine and Shipbuilding Workers of America (CIO).

*See also* Arc and Gas Welders, page 278.

## Riveter, Pneumatic (Manufacturing)

(See D.O.T. 4-84.060; 6-95.080 and .082)

### *Outlook Summary*

Employment of riveters is expected to rise during the next few years; over the long run it will decline, as riveting is largely being replaced by welding and other metal-joining methods.

### *Nature of Work*

These workers use pneumatic hammers to rivet together steel plates and metal parts. The more skilled riveters do many types of work; they must be able to read blueprints, use riveting hammers of varied types and sizes, and select appropriate hammers, dies, and rivets. However, most riveters in manufacturing plants do repetitive work which does not call for the skills of the all-round riveter.

Some of the more skilled riveting in certain industries, boilermaking and shipbuilding, for example, is done by journeymen qualified in other occupations, such as structural iron worker, boiler-maker, and sheet-metal worker.

Pneumatic riveters who are employed in manufacturing industries are found mainly in plants making aircraft, industrial cars and trucks, and agricultural equipment; boilermaking shops; locomotive and car-building and repairing shops; and shipyards.

The less skilled pneumatic riveters are generally trained in several months on the job. Boilermakers, sheet-metal workers, and other journeymen who do skilled riveting have had formal apprenticeships or the equivalent in experience.

While women were employed as riveters during the war, especially in aircraft assembly and shipbuilding, it is predominantly a male occupation.

### *Outlook*

In the next several years, there should be a relatively big increase in the number of jobs for riveters, with practically all of the rise occurring in aircraft plants. Many of these jobs, which will be concentrated in a few aircraft-producing centers, will be filled by wartime riveters now employed in other occupations.

In other metalworking industries, replacement needs will provide a limited number of openings. The more-skilled riveters will be preferred for most of these jobs.

After several years of relatively high employment in this occupation the number of jobs will begin gradually to decline. This will result, in part, from technological changes, particularly the substitution of welding for riveting in the fabrication of many products, which already has resulted in greatly decreased use of riveters in recent years. The effects of these developments have been particularly felt in the aircraft, shipbuilding, and boilermaking industries.

### *Earnings and Working Conditions*

In October 1946 male pneumatic riveters in the machinery industries (except electrical machinery, machine tools, and machine-tool accessories) had average straight-time hourly earnings of \$1.18. Since that date there generally have been wage increases in machinery plants employing riveters.

Riveting is noisy work, and much of it is done in cramped positions (for example, inside aircraft fuselages).

## Blacksmiths

(D.O.T. 4-86.010)

### *Outlook Summary*

Long-run prospects are for little change in the employment of blacksmiths. Replacement needs will provide some opportunities for new workers.

### *Nature of Work*

Blacksmiths use mainly hand methods to shape and repair metal articles and parts. They heat metal in a forge and hand-hammer the metal on an anvil into the desired shape. They also forge-weld metal by heating the pieces and hammering them together; sharpen tools such as chisels, drills, and picks by heating them and hammering the

cutting edges to proper shape; and heat-treat metal articles to improve their physical properties.

### *Where Employed*

Most blacksmiths work in small shops which repair farm and garden equipment, tools, automobile parts, and household articles. Often these shops perform other services, such as welding and tool dressing; a few shoe horses. Many blacksmiths are self-employed, operating their own shops.

Other blacksmiths are employed in maintenance and repair departments in metalworking plants,

Blacksmiths use mainly hand methods to shape and repair metal articles and parts.

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in railroad repair shops, and in coal and metal mining.

Blacksmiths are found in all parts of the country, many in small rural communities as well as in large industrial centers.

### *Training and Qualifications*

Some workers enter this occupation through apprenticeship, others by picking up the trade while working as laborers or helpers in blacksmith shops. The apprenticeship period is generally 3 or 4 years and customarily includes blueprint reading, training in the use of tools and equipment, heat-treating metal, forging methods, and welding.

Considerable physical strength is required in order to pound metal into shape and to handle heavy metal parts.

### *Outlook*

There will be a small number of openings for new workers in this occupation. Few young men

have entered the occupation in the last several decades.

A large proportion of the men now engaged in the trade are of relatively advanced age, nearing the time when they will have to be replaced. Openings for new workers will occur because of this replacement demand rather than because of expanding employment.

Prospects for those entering the occupation are for continued employment over a long period. About 40,000 blacksmiths were employed in 1940, substantially fewer than 20 or 30 years ago. However, there has been little change in employment in recent years and no further decline is anticipated. The number of blacksmiths working in small repair shops is expected to remain stable because of the diversified demands for their services and the importance of blacksmithing in local communities. Since blacksmiths employed in manufacturing plants, railroads, and mines generally do maintenance work, which tends to be fairly steady, there should not be much fluctuation in the number of jobs for these workers.

## Millwrights

(D.O.T. 5-78.100)

### *Outlook Summary*

Prospects are for fairly stable employment in this occupation, with replacement needs providing opportunities for new workers.

### *Nature of Work*

The job of a millwright is to install, dismantle, move, and set up heavy machinery and industrial equipment. Millwrights also prepare the platforms on which machines are mounted and help plan the location of new equipment in the plant. They sometimes perform some of the duties of industrial machinery repairmen in addition to their regular work. They should have considerable knowledge of the structure and operation of the equipment on which they work. Millwrights often specialize on particular types of industrial machinery, such as paper-mill machinery, machine tools, or chemical-plant equipment.

### *Where Employed*

Millwrights are employed in most manufacturing plants which use heavy machinery and equipment. Many of these workers are in the metal-working industries, such as iron and steel, automobiles, and machinery. Other large groups are employed in various nonmetal industries, including pulp-and-paper mills, meat packing houses, sawmills, and flour mills. Some millwrights are employed by building contractors in the installation of machinery and equipment in new factory buildings. A small number work for machinery manufacturers who do the installation of their machinery in customers' plants.

Millwrights work in every State. However, most of the millwright jobs are in the major industrial areas of the Midwest and Northeast, with Michigan, Ohio, Pennsylvania, and New York the leading States.

### *Training and Qualifications*

Entry into this occupation is usually through a millwright apprenticeship or equivalent on-the-job training. The apprenticeship period is generally 4 years and the training customarily includes blueprint reading; use of hoisting equipment; installation, assembly, and repair of industrial machinery and equipment; and acetylene burning. On the other hand, inexperienced workers may be hired as helpers or trainees and pick up the occupation while working.

### *Outlook*

The number of jobs for millwrights is expected to remain at its present high level during the next few years. Continuing large expenditures for new plants and equipment by such expanding manufacturing industries as iron and steel, chemicals, and automobiles will require many millwrights. Other industries in which millwrights are employed, such as pulp and paper, face several years of high activity.

After the next several years the number of millwright jobs may decline somewhat as retooling and new equipment purchases fall off. However, employment in this occupation is expected to hold up fairly well. Growing mechanization of industry has a tendency to expand the need for millwrights. Moreover, these workers have continuing functions in plants using heavy equipment, in connection with repair and rearrangement of the equipment.

Replacement needs will provide numerous opportunities for new workers. There are many experienced millwrights approaching the age when death or retirement will take them from their jobs, and new men will have to be trained to fill these positions.

### *Earnings and Working Conditions*

The pay of millwrights compares favorably with that of many other maintenance jobs. Recent information on wages for most industries employing millwrights is not available. In October 1946 average straight-time hourly earnings for millwrights in large cities in the machinery industries (except electrical machinery, machine tools, and machine-tool accessories) was \$1.32. In independent ferrous foundries in the same period they earned an average of \$1.29. Since October 1946 there generally have been wage increases in foundries and machinery plants.

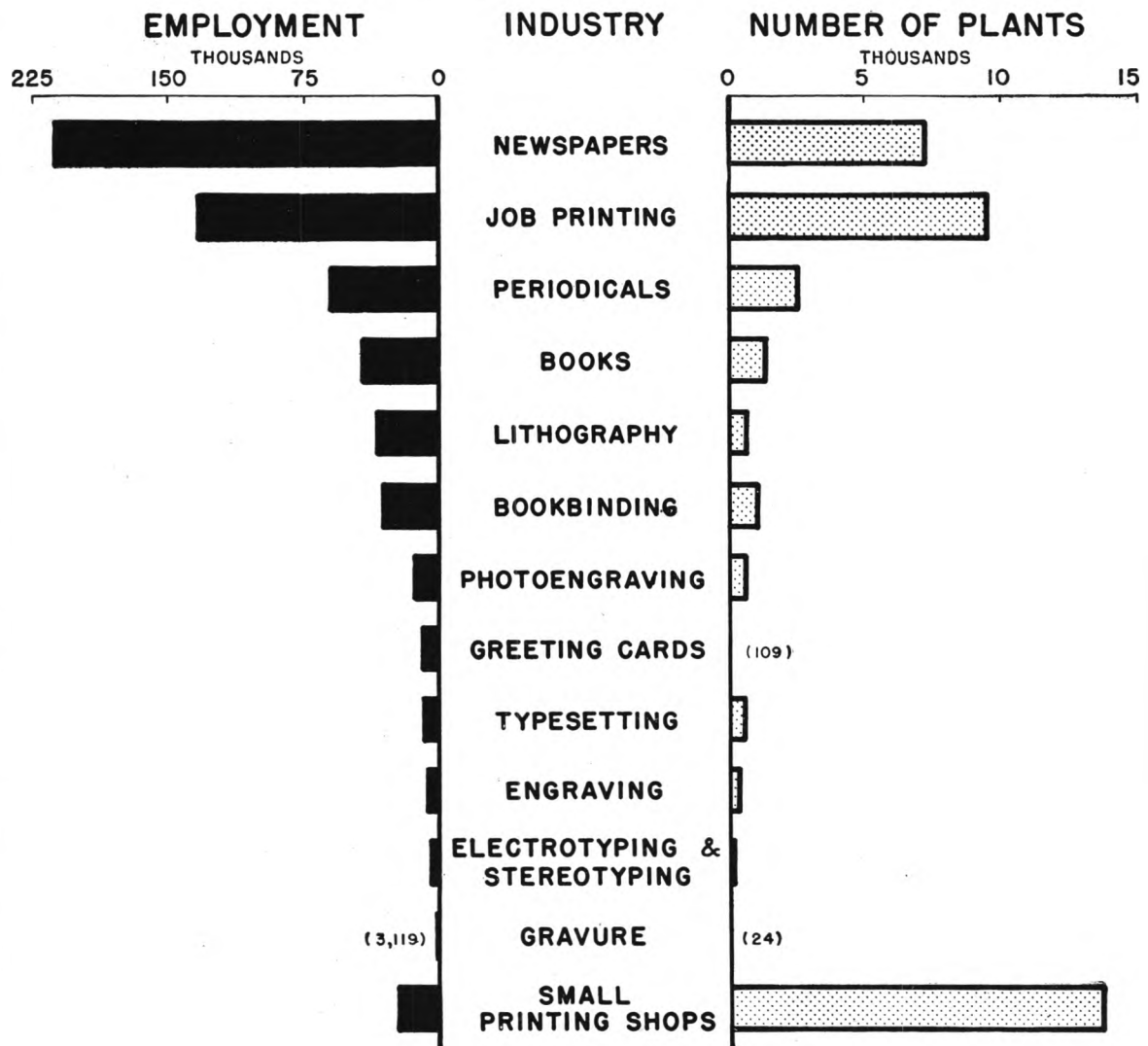
Millwrights are generally unionized. Their union affiliation varies according to the industry in which they are employed. Some of the more important unions include the International Association of Machinists (Ind.), United Steelworkers of America (CIO), United Electrical, Radio and Machine Workers of America (CIO), International Brotherhood of Carpenters and Joiners (AFL), and International Brotherhood of Pulp, Sulphite and Paper Mill Workers (AFL).

*See also* Industrial Machinery Repairmen, page 201.

CHART 42

# NEWSPAPER AND JOB SHOPS EMPLOY MOST PRINTING WORKERS

NUMBERS EMPLOYED AND NUMBERS OF PLANTS  
IN PRINTING AND ALLIED INDUSTRIES, 1939



UNITED STATES DEPARTMENT OF LABOR  
BUREAU OF LABOR STATISTICS

Source: CENSUS OF MANUFACTURERS AND CENSUS OF BUSINESS  
REFER TO APPENDIX FOR FIGURES AND EXPLANATIONS

# *Printing Occupations*

Printing is an art, a great industry, and one of our chief means of communication. Its contribution to the growth of democracy was so fundamental that freedom of the press was one of the basic rights incorporated in the first amendment to the United States Constitution.

About 725,000 men and women made their living in the printing industries in 1948. Printing is especially important as a field of employment for men capable of attaining a high level of skill. It affords opportunities in many different skilled occupations, and, as a rule pays better-than-average wages. Jobs are to be found in all parts of the country, in small towns as well as large cities. Many printing craftsmen are in business for themselves.

## *The Printing Industries*

More than a third of the people working in the printing industries in 1939 were in newspaper shops. General commercial or job printing is the second largest printing industry; there are many more commercial shops than newspaper plants, but the average job shop is small. Periodicals and books are the next largest printing industries. Smaller industries are engaged mainly in producing lithographed items of various types, greeting cards, or gravure products, or in doing bookbinding and other bindery work. The so-called service industries for the printing trades do mainly typesetting, photoengraving, or other work for printing shops.

Almost every small town has a printing shop of some kind—frequently a small newspaper plant which also handles any job printing needed in the community. However, a large part of the country's printing is done in 10 industrial centers—New York, Chicago, Philadelphia, Los Angeles, San Francisco, Detroit, Cleveland, St. Louis, Cin-

cinnati, and Minneapolis-St. Paul. In 1939, about half of all employees in the printing and allied industries were in these centers.

## *Methods of Printing*

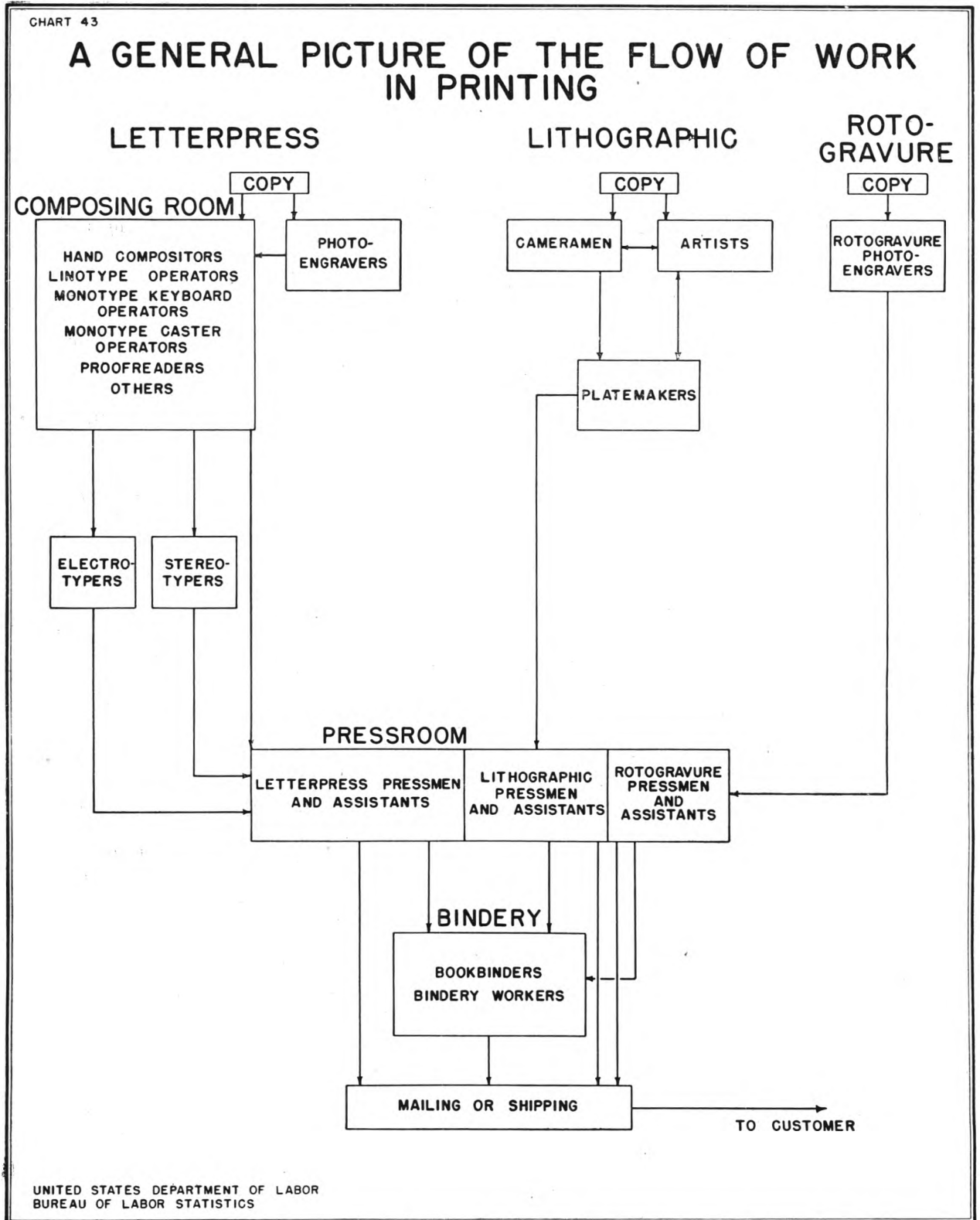
Letterpress (or relief) printing is the oldest and by far the most common printing process. Practically all newspapers, most books and magazines, and most commercial jobs are printed by this method.

Lithography, though still much less common than letterpress work, is the most rapidly growing method of reproduction. Practically all items printed by the relief process are also produced by lithography—including, for example, books, calendars, maps, posters, labels, office forms, sheet music, and even newspapers. Almost all printing on metal and much of the printing on rough paper is done by this method.

Gravure printing, the least common process, is of two main types: Rotogravure (in which press plates are made from pictures by a method based on photography) and hand or machine engraving. The picture supplements of some Sunday newspapers are the best known rotogravure products. Hand or machine engraving is used in making engraved stationery, greeting cards, and similar products.

## *The Printing Workers*

The largest group of skilled and semiskilled workers are in the composing room, the department responsible for typesetting. Other major groups are the printing pressmen and their assistants, photoengravers and rotogravure photoengravers, electrotypers and stereotypers, lithographic workers, and bookbinders and bindery workers. Chart 44 shows the number of people employed in 1940 in each of the main occupations in these categories.





### *Employment Prospects*

There will be many thousands of job openings in printing during the next few years. The outlook is for greater and greater activity and employment in all branches of printing at least during the next few years, because of growing demands for printed products such as advertising materials and textbooks, increasing availability of new machinery and supplies, and other factors. Unusually large numbers of job openings due to retirements and deaths may also be expected for a while, because of the postponement of retirements during and since the war and the fact that the average age of journeymen is therefore higher than before. For all these reasons, it will generally be easy for skilled workers to get jobs during the years immediately ahead, and there will be moderate numbers of training opportunities.

Workers who now have jobs or succeed in getting them in the near future should have a good chance of holding them indefinitely. Printing employment tends to be less affected by declines in general business activity than employment in manufacturing as a whole. Moreover, the long-run trend in employment is upward in most printing occupations.

In general, the largest number of job openings will be in the printing centers previously mentioned. Opportunities will, however, be more widespread in some branches of printing than in others. They will, for example, be more scattered in newspaper than in job printing; but in lithography, they will be concentrated in the major centers to a greater extent than in either of those industries. In all branches of printing, competition for jobs is likely to be keenest in the largest cities.

### *Earnings*

Earnings tend to be higher in printing than in many other industries, owing to the large number of skilled workers employed, the strong influence of the printing unions, and other factors. In early 1948, earnings averaged over \$1.50 an hour in book and job shops and well over \$1.80 in newspapers and periodicals, compared with about \$1.30 in all manufacturing.

What an individual printing worker can expect to make varies greatly from one occupation to an-

other, as well as from city to city and in other ways. The best source of information on wages in different occupations are union wage scales. These scales are the minimum rates paid under collective-bargaining agreements and are usually uniform for each occupation in a given locality. They are, in general, representative of wage rates in skilled and semiskilled printing trades, which are all highly organized.

In January 1948, union wage scales averaged about \$2 an hour. For the skilled workers covered rates were typically between \$1.85 and \$2.30 an hour; for the others they were usually between \$1 and \$1.70. Tables 1 and 2 give union wage rates for the major printing trades in a large number of cities.

The wage scales cited are the basic rates received by employees on day shifts. In most printing plants, as in many other manufacturing establishments, workers are paid time and a half for overtime work not only above a standard number of hours a week but also above 8 hours a day. The standard workweek is usually 37½ hours in newspaper plants. In other printing shops, it is usually 40 hours. Work on Sundays and holidays is customarily paid for at time-and-a-half or double-time rates in most branches of printing. In newspaper plants, the standard workweek often includes Sundays and work has to go on as usual on holidays; however, time and a half or double time is paid for these days only when they are not part of the employee's regular shift. Night-shift workers in union shops generally receive extra pay. There are many other types of provisions for overtime and special rates of pay.

How much workers earn during a year depends not only on their rates of pay but also on how regularly they are employed. Printing workers are fortunate in having steadier employment and earnings than those in many other industries. Earnings tend to be especially steady in newspaper work.

Paid vacations are called for by most wage agreements. The majority of union workers receive 2 weeks' vacation with pay after 1 year of employment. In addition, the printing unions are noted for welfare provisions for their members; for example, pensions, sanitarium facilities, and educational programs.

TABLE 1.—Union Wage Scales in Major Newspaper Printing Trades in Selected Cities, January 2, 1948<sup>1</sup>

City and State	Hand com- positors	Composing- machine operators	Stereotypers	Photo- engravers	Journeyman pressmen	Pressmen- in-charge
Atlanta, Ga.			\$2.19	\$2.08	\$2.19	\$2.34
Baltimore, Md.	\$2.26	\$2.26	1.81	2.16	1.81	2.00
Binghamton, N. Y.	1.73	1.73	1.73		1.73	
Birmingham, Ala.	1.90	1.90	1.83	1.95	1.80	1.89
Boston, Mass.	2.40	2.40	2.47	2.58	2.00-2.18	2.14-2.33
Buffalo, N. Y.	2.19	2.28	2.09	2.45	1.96-2.10	2.13-2.27
Butte, Mont.			2.02		2.00	2.15
Charleston, W. Va.			1.75		1.80	2.03
Charlotte, N. C.	1.85	1.85	1.88		1.85	
Chicago, Ill.			2.04	2.51	2.01	2.19
Cincinnati, Ohio			2.11	2.37	2.04	2.17
Cleveland, Ohio	2.40	2.40		2.40	2.29	2.52
Columbus, Ohio	2.28	2.28	2.01	2.64	2.00	2.13
Dallas, Tex.	2.24	2.24	2.16		2.12	2.33
Davenport, Iowa	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
Dayton, Ohio	2.20	2.20	2.13	2.09	2.00	2.11
Denver, Colo.	2.21	2.21	1.93-1.99	2.12	2.06	2.19
Des Moines, Iowa	1.92	1.92	1.91	2.20	2.11	
Detroit, Mich.	2.55	2.55	2.46	2.41	2.13-2.39	2.40-2.66
Duluth, Minn.	1.85	1.85	1.63	1.88	1.66	1.80
El Paso, Tex.	2.00	2.00	1.84		1.84	1.87
Erie, Pa.	1.97	1.97	1.63		1.81	
Grand Rapids, Mich.	2.05	2.05	2.05	2.00	1.88	
Houston, Tex.	2.27	2.27	1.96	2.30	1.89	1.95
Indianapolis, Ind.	2.11	2.11	2.09	2.44	2.04	2.20
Jacksonville, Fla.	2.29	2.29	2.29	2.00	2.00	2.13
Kansas City, Mo.	2.13	2.13	1.70	2.40	1.75-2.18	1.81
Little Rock, Ark.	1.73	1.73	1.64		1.64	1.74
Los Angeles, Calif.	2.07	2.07	2.07	2.51	1.94	2.07
Louisville, Ky.			2.08	2.21	1.97	2.24
Madison, Wis.	2.00	2.00	2.00		2.00	2.08
Manchester, N. H.	1.87	1.87	1.87	1.71		
Memphis, Tenn.	2.13	2.13	1.77	2.19	1.78	2.00
Milwaukee, Wis.	2.06	2.05	1.97	2.24	1.91	2.07
Minneapolis, Minn.	2.35	2.35	2.20	2.35	2.20	2.37
Mobile, Ala.	1.80	1.80	1.90		1.90	
Moline, Ill.	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
Nashville, Tenn.	2.05	2.05	2.04	2.29	2.04	2.21
Newark, N. J.	2.20	2.20	2.03	2.19	2.10	2.29
New Haven, Conn.	1.89	1.89	1.75		1.80	1.90
New Orleans, La.	1.90	1.90	1.65	1.95	1.70	1.85
New York, N. Y.	2.48	2.48	2.25	2.59	2.33	2.54
Norfolk, Va.			1.88	1.96	1.89	
Oklahoma City, Okla.	1.83	1.83	1.65	2.13	1.76	1.89
Omaha, Nebr.	1.95	1.95	1.95	1.88	1.74	1.89
Peoria, Ill.	2.00	2.00	1.92	2.20	2.00	2.13
Philadelphia, Pa.	2.13	2.13	1.65	2.37	2.00	2.20
Phoenix, Ariz.	2.00	2.00	2.00		1.90	
Pittsburgh, Pa.	2.40	2.40	1.97	2.31	1.89	1.96
Portland, Maine	1.63-1.71	1.63-1.71	1.71		1.71	
Portland, Oreg.	2.48	2.48	2.01	2.20	1.95	2.05
Providence, R. I.	2.30	2.30	2.24		1.95	2.08
Reading, Pa.	1.79	1.79	1.79		1.79	1.92
Richmond, Va.	1.94	1.94	1.63	1.63	1.88	2.13
Rochester, N. Y.	1.97	1.97	1.97	2.24	1.97	2.11
Rock Island (Ill.) district <sup>2</sup>	1.96	1.96	1.96	1.87	1.96	2.12
St. Louis, Mo.	2.47	2.47	2.09	2.59	2.28	2.47
St. Paul, Minn.	2.30	2.30	1.92	2.30	1.92	2.45
Salt Lake City, Utah	2.07	2.07	1.75	1.97	1.83	1.97
San Antonio, Tex.	2.03	2.03	1.83	1.75	1.86	2.11
San Francisco, Calif.	2.17	2.17	2.06	2.25	2.07	2.27
Scranton, Pa.	2.05	2.05	1.98		1.94	2.06
Seattle, Wash.	2.19	2.19	2.19	2.59	2.05	2.18
South Bend, Ind.	1.96	1.96	1.98			
Spokane, Wash.	2.00	2.00	1.93		1.89	2.02
Springfield, Mass.				1.87		
Tampa, Fla.	1.95	1.95	1.95	1.65	1.95	2.18
Toledo, Ohio	2.28	2.28	2.21	2.32	2.18-2.27	2.33-2.55
Washington, D. C.	2.43	2.43	2.10	2.30	1.90	2.03
Wichita, Kans.	1.88	1.88	1.55	1.88	1.73	1.79
Worcester, Mass.	1.87	1.87	1.89	2.08	1.80	1.92
York, Pa.	1.78	1.78	1.78			
Youngstown, Ohio	2.13	2.13	2.04		1.78	1.91

<sup>1</sup> U. S. Bureau of Labor Statistics, Wage Analysis Division: *Union Wage Scales, Newspaper Printing Trades, January 2, 1948* (available upon request). These scales are the minimum wage rates agreed upon through collective bargaining between employers and trade unions and are, in most cases, uni-

form for each occupation in a given locality. Where no rate is given, there was no effective union wage scale for the occupation in the particular city.

<sup>2</sup> Rock Island district includes Rock Island and Moline, Ill., and Davenport, Iowa.

PRINTING OCCUPATIONS

TABLE 2.—Union Wage Scales in Major Book and Job Printing Trades in Selected Cities, January 2, 1948<sup>1</sup>

City and State	Hand compositors	Composing-machine operators	Electrotypers	Photo-engravers	Cylinder pressmen	Platen pressmen	Press assistants and feeders	Book-binders	Bindery women
Atlanta, Ga.			\$2.17	\$2.35	\$1.58-2.16	\$2.00	\$1.13-1.35	\$1.99	\$1.03
Baltimore, Md.	\$1.75	\$1.75	1.75	2.08-2.29	1.60-1.98	1.49	1.14-1.46	1.55	.63-.85
Binghamton, N. Y.					1.50-1.73	1.50-1.63	1.10-1.18	1.02-1.45	.78-.88
Birmingham, Ala.	2.00	2.00	2.01	1.95	1.80-2.15	1.52	.90-1.25	1.80	1.00
Boston, Mass.	1.81	1.81	\$1.90-1.92	2.27	1.81-1.96	1.63-1.72	1.02-1.70	1.81	.98
Buffalo, N. Y.	2.04	2.04	1.55	2.16	1.96-2.18	1.82	1.42-1.78	1.83	.93
Butte, Mont.					1.89	1.75	.79-1.13	1.89	1.11
Charleston, W. Va.	1.98	1.98			1.98			1.98	1.13
Charlotte, N. C.	1.85	1.85			1.80	1.55		1.45	.87
Chicago, Ill.			2.50	2.39	2.02-2.80	2.16-2.35	1.68-2.44	2.12-2.44	1.27-1.31
Cincinnati, Ohio			1.92		1.54-2.21	1.54-1.64	1.03-1.72	1.90	1.07
Cleveland, Ohio.	2.15	2.20	2.05	2.40-2.48	1.86-2.25		1.41-1.79	2.00	.95-1.02
Columbus, Ohio.	2.08	2.08	1.84		2.08	2.08	1.72	2.08	1.13
Dallas, Tex.	2.25	2.25		2.00	1.07-1.88	1.66	1.07-1.45		
Davenport, Iowa.	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )		( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )		
Dayton, Ohio.	2.14	2.14	2.25	2.20	1.66-2.43	1.83-2.06	.90-1.70	1.85-1.95	.90-1.10
Denver, Colo.	1.75	1.75	2.00	1.83	1.75	1.61	.82-1.44	1.61	.98
Des Moines, Iowa.	1.90	1.90	1.84	2.20	1.81-1.98	1.70	1.20-1.58	1.61	.90
Detroit, Mich.	2.30	2.30	2.26	2.13	2.08-2.15	1.85	1.35-1.83	1.25-1.80	.92-1.07
Duluth, Minn.	1.45				1.40	1.10	.80		
El Paso, Tex.					1.84	1.84			
Erie, Pa.	1.80	1.80			1.75	1.60			
Grand Rapids, Mich.	2.05	2.05	1.70		1.85	1.60	1.15-1.45		
Houston, Tex.	2.27	2.27	2.10		1.95	1.70-1.85	1.65-1.71		
Indianapolis, Ind.	2.00	2.00	2.00	2.21	1.65-2.07	1.83-1.97	1.17-1.84	1.97	1.09
Jacksonville, Fla.	1.50	1.50		1.95				1.25	.70
Kansas City, Mo.	2.11	2.11	2.13	1.88	2.11-2.27	1.96-2.06	1.33-1.67	2.00	1.15
Little Rock, Ark.	1.56	1.56			1.19	1.19	.60-.83	1.56	.80
Los Angeles, Calif.	2.05	2.05	2.20	2.00	2.25-2.36	2.14	1.61-1.96	2.25	1.35
Louisville, Ky.				2.00	1.37-2.16	1.35-1.46	.98-1.62		
Madison, Wis.	1.81	1.81		2.34					
Manchester, N. H.				1.71	1.50	1.30			
Memphis, Tenn.	1.63	1.63	1.88		1.58	1.35-1.60	.81-1.05	1.53	.81
Milwaukee, Wis.	2.06	2.06	2.00	2.34	1.90-2.10	1.88	1.23-1.76	1.90	.95
Minneapolis, Minn.	1.87	1.87	2.05	1.71	1.30-2.07	1.37-1.82	.77-1.62	1.74	.90
Mobile, Ala.	1.90	1.90			1.70	1.70			
Moline, Ill.	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )		( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )		
Nashville, Tenn.	1.80	1.93	1.75	2.06	1.41-1.80	1.33-1.53	.91-1.30	1.28-1.65	.85
Newark, N. J.			2.50	2.71	1.80-2.35	2.00-2.40	1.20-1.96	1.72-2.10	1.10
New Haven, Conn.	1.75	1.75	2.00	2.00	1.70-1.88	1.58	1.35-1.48	1.65	.80
New Orleans, La.	1.80	1.80	2.03	1.90	1.65-1.78	1.20	.80-1.28	1.65	.85
New York, N. Y.	2.23	2.23	2.50	2.74	2.23-2.53	1.95-2.10	1.38-1.92	.85-2.24	.90-1.08
Norfolk, Va.	1.75-1.94	1.75-1.94						2.03	
Oklahoma City, Okla.	1.65	1.65	1.66	2.00	1.65	1.51	1.04-1.17	1.65	.90
Omaha, Nebr.			1.75	1.88	1.45	1.45	1.20		
Peoria, Ill.	1.90	1.90	1.85		1.85	1.73	1.45-1.65		
Philadelphia, Pa.	1.84	1.84	2.35	2.02	1.75-2.29	1.86	1.28-1.76	1.56-1.74	.85-.90
Phoenix, Ariz.	2.00	2.00			1.76	1.61	1.21-1.32		
Pittsburgh, Pa.	2.24	2.24	1.70	2.13	1.92-2.35	1.83	1.13-1.70	1.65	.89
Portland, Maine.	1.13	1.13			1.11	1.00			
Portland, Oreg.	2.00	2.00	2.19	2.40	2.00-2.13	1.93	1.35-1.60	2.00	1.20
Providence, R. I.	1.70	1.70	1.90						
Reading, Pa.	1.73	1.73			1.69	1.58-1.63	1.47-1.63		
Richmond, Va.			1.88	1.88	1.25-1.88	1.15	1.00-1.54	1.43-1.64	.65-.85
Rochester, N. Y.	1.75-1.97	1.75-1.97		2.00	1.60-2.18	1.44-1.97	1.12-1.59	1.70-1.92	.93-1.06
Rock Island (Ill.) district <sup>2</sup>	1.75	1.75	1.76		1.66	1.43	1.32		
St. Louis, Mo.	2.12	2.12	1.96	2.16	1.80-2.25	1.73-1.87	1.10-1.90	1.90	1.10
St. Paul, Minn.	1.87	1.87	2.05	1.71-2.13	1.87-2.30	1.32-1.95	1.07-1.52	1.40-1.74	.77-1.06
Salt Lake City, Utah.	1.75	1.75			1.70	1.70	1.25		
San Antonio, Tex.	1.90	1.90		1.75	1.50	1.35	.75-1.00	1.50	.75
San Francisco, Calif.	2.41	2.41	2.27		1.87-2.65	2.41	1.57-1.98	2.41	1.39
Scranton, Pa.	1.92	1.92	1.95		1.88-1.99	1.60	1.25-1.60	1.64-1.69	.96
Seattle, Wash.	2.14	2.14	2.29	2.79	2.14	1.97	1.41-1.70	2.14	1.22
South Bend, Ind.	1.95	1.95	2.00	2.00				1.90	1.02
Spokane, Wash.	1.88	1.98			1.88	1.88	1.40-1.44	1.88	1.00
Springfield, Mass.			2.00	1.87				1.73	
Tampa, Fla.	1.75	1.75				1.65			
Toledo, Ohio.	1.95-2.07	1.95-2.07	1.75	2.00	1.95	1.83-1.88	1.68	1.80	1.15
Washington, D. C.	2.11	2.11	2.26	2.21	1.83-2.36	1.61-1.74	1.23-1.73	1.75	.90
Wichita, Kans.	1.88	1.88		1.88	1.82	1.60-1.82	1.26-1.54	1.78	1.03
Worcester, Mass.	1.60	1.60	1.90						
York, Pa.	1.70	1.70	1.59					1.45	.85
Youngstown, Ohio.				2.13	1.84-1.91	1.84	.85-1.25		

<sup>1</sup> U. S. Bureau of Labor Statistics, Wage Analysis Division: Union Wage Scales, Book and Job Printing Trades, January 2, 1948 (available upon request). These scales are the minimum wage rates agreed upon through collective bargaining between employers and trade unions and are, in most cases, uniform for each occupation in a given locality. Where no rate is

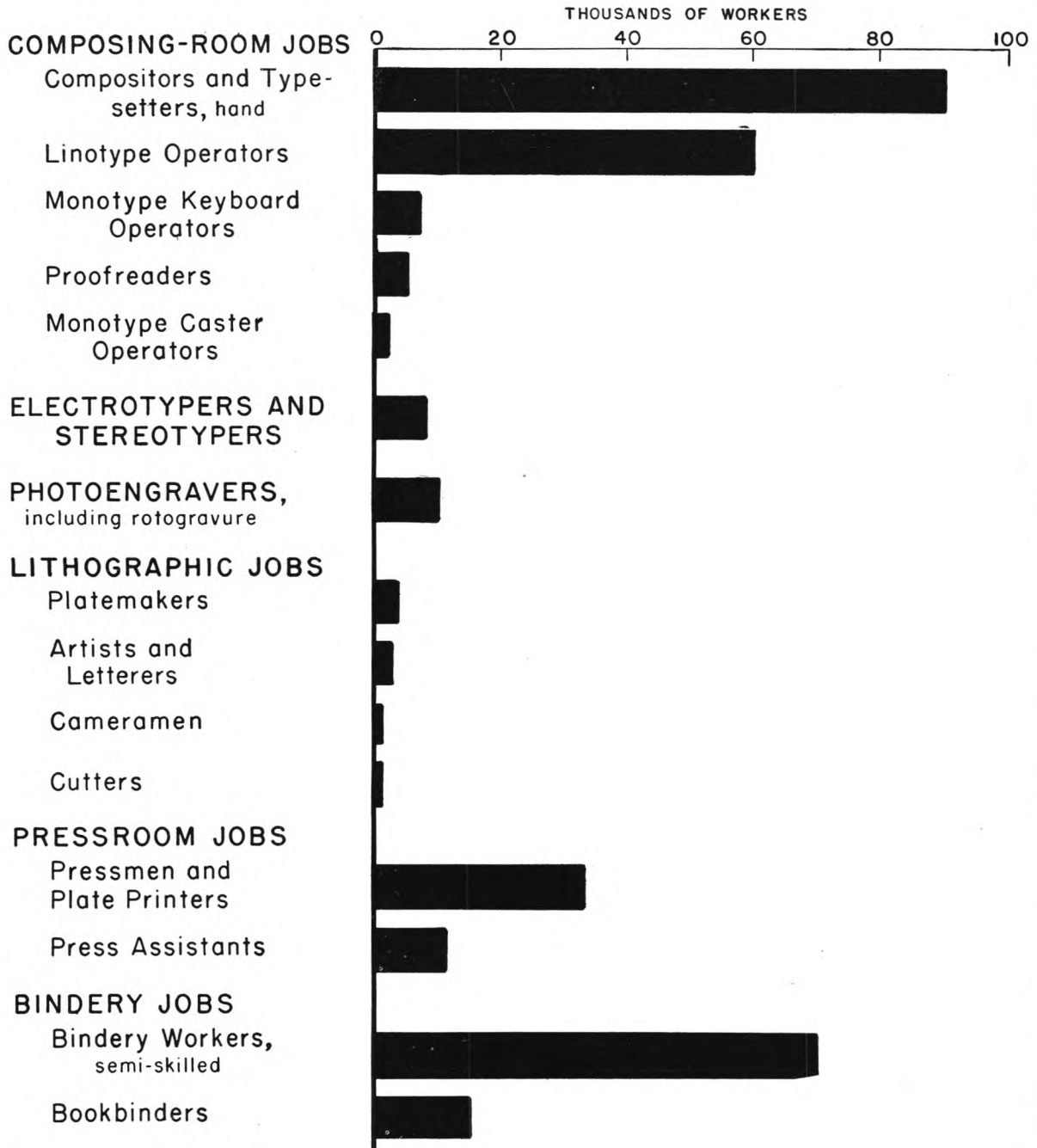
given, there was no effective union wage scale for the occupation in the particular city. In this table, book and job printing includes all branches of printing except newspaper.

<sup>2</sup> Rock Island district includes Rock Island and Moline, Ill., and Davenport, Iowa.

CHART 44

# MAJOR PRINTING OCCUPATIONS

## EMPLOYMENT, 1940



UNITED STATES DEPARTMENT OF LABOR  
BUREAU OF LABOR STATISTICS

BASED ON 1940 CENSUS OF POPULATION  
AND OTHER SOURCES

*How To Enter Printing Occupations*

Apprenticeship is the accepted way of entering skilled printing occupations. With very rare exceptions, it is the only means by which one may qualify as a journeyman in a union shop. Printing apprenticeships usually last from 4 to 6 years, depending on the occupation and whether the shop is union or nonunion. The training program covers all phases of the particular trade and almost always includes classes in related technical subjects as well as training on the job. When an apprentice starts out, he is usually paid 30 or 40 percent of the wage rate for journeymen. However, his pay is increased once or twice a year until, in the final year or half year of training, he receives 80 or 90 percent of the journeyman rate. Men who have had some experience in the trade in either civilian life or in the armed forces can often obtain credit for this. They will then start out at a wage above the beginning apprentice rate, and the length of time before they become journeymen will be reduced.

To be eligible for apprenticeship, applicants are generally required to be 18 (though sometimes only 17) years of age and not over 30. A physical examination is usually given. Exceptional physical strength is rarely required, and the industry is, on the whole, a relatively good field of employment for handicapped people. A considerable number of workers with speech or hearing defects—even some who are totally deaf—are employed, particularly as linotypists and compositors. Men who have lost one or both legs or do not have the use of all 10 fingers have proved satisfactory in some composing-room occupations.

High school graduation is usually required and always preferred. A thorough knowledge of spelling, punctuation, and grammar is essential for most trades. Technical training in a printing trade school is desirable. If a person had printing courses in high school this will also be greatly in his favor. In addition, courses in art, such as drawing, design, color, and lettering, are helpful for many kinds of printing work.

*Where To Get More Information*

Additional information on the printing industries, on methods of printing, and on typesetting and many other printing occupations is given in—

**Employment Outlook in Printing Occupations.** Bulletin No. 902. U. S. Department of Labor, Bureau of Labor Statistics, 1947. 36 pp., illus. 20 cents. Superintendent of Documents, Washington 25, D. C.

Information on opportunities for apprenticeship or other kinds of jobs in a particular locality may be obtained directly from printing plants or from local unions and local employer associations. If none are listed in the telephone directory, applicants may write to the following national organizations and ask them to refer the letters to their nearest branches:

**Amalgamated Lithographers of America (CIO)**  
450 Seventh Ave.  
New York, N. Y.

**American Newspaper Publishers Association**  
370 Lexington Ave.  
New York 17, N. Y.

**American Photo-Engravers Association**  
166 West Van Buren St.  
Chicago 4, Ill.

**Book Manufacturers Institute**  
25 West Forty-third St.  
New York, N. Y.

**Employing Bookbinders of America**  
28 West Forty-fourth St.  
New York, N. Y.

**Employing Printers Association of America**  
53 West Jackson Blvd.  
Chicago 4, Ill.

**International Allied Printing Trades Association (AFL)**  
307 AFL Bldg.  
Washington 1, D. C.

**International Association of Electrotypers and Stereotypers, Inc.**  
350 East Twenty-second St.  
Chicago, Ill.

**International Brotherhood of Bookbinders (AFL)**  
901 Massachusetts Ave., NW.  
Washington 1, D. C.

**International Photo-Engravers' Union of North America (AFL)**  
292 Madison Ave.  
New York 17, N. Y.

**International Printing Pressmen's and Assistants' Union of North America (AFL)**  
Pressmen's Home, Tenn.

**International Stereotypers' and Electrotypers' Union (AFL)**  
475 Fifth Ave.  
New York, N. Y.

**International Typographical Union (AFL)**  
P. O. Box 728  
Indianapolis 6, Ind.

**Joint Lithographic Advisory Council**  
70 Pine St.  
New York, N. Y.  
Benjamin M. Robinson, Secretary

Library Binding Institute  
501 Fifth Ave.  
New York, N. Y.

Lithographers National Association, Inc.  
420 Lexington Ave.  
New York 17, N. Y.

Lithographic Technical Foundation, Inc.  
131 East Thirty-ninth St.  
New York 17, N. Y.

National Association of Photo-Lithographers  
1776 Broadway  
New York 19, N. Y.

National Publishers Association  
232 Madison Ave.  
New York 16, N. Y.

Printing Industry of America, Inc.  
719 Fifteenth Street, NW.  
Washington 5, D. C.

## Hand Compositors and Typesetters

(D.O.T. 4-44.010)

### *Outlook Summary*

Very good employment prospects for qualified journeymen in most parts of country in near future; also diminishing number of apprenticeship opportunities. After next few years, employment will probably resume its long-range downward trend.

### *Nature of Work*

The oldest and largest composing-room occupation is that of hand compositor and typesetter. In some small shops, all the type is still set by hand. This involves setting each line of type in a composing stick—letter by letter and line by line—and, when the stick is full, sliding the completed lines onto a shallow metal tray or galley. In many shops, all straight matter (such as you are now reading) is set by machine, but hand compositors are still needed to set some of the type required for headlines, titles, and other special work, and to assemble the machine- and hand-set type. Taking proofs of type that has been set (that is, printing a few copies on a proof press), checking the proofs against the original copy, and correcting errors in typesetting are among the other duties sometimes performed by compositors, particularly in small shops. These workers may be responsible also for page make-up (arranging type and any needed engravings into pages) and for locking the completed pages into forms. In large plants, however, page make-up is usually done by special make-up men, chosen from among the compositors, and the type forms are generally locked up by stonemen.

All the major branches of printing—newspaper, job, book, and periodical—employ large numbers

of hand compositors. Smaller numbers work in other kinds of printing shops or in service shops doing typesetting on contract for printing establishments. A good many men in the occupation have their own small job or service shops.

### *How To Enter the Occupation*

A 6-year apprenticeship is usually required for employment as a journeyman. In union shops, the apprenticeship is always of this length, except in the case of some veterans with military experience related to printing and of particularly outstanding apprentices for whom shop foremen recommend shorter training periods.

Apprentices have come mostly from among the high-school graduates whose programs included printing courses. A thorough knowledge of spelling, punctuation, and grammar is especially important in this occupation, since the worker should be able to catch errors in copy before setting type. Facility in arithmetic is also needed to assist him in calculating the spacing of type on pages. Imagination and artistic ability in planning page layouts may help him to advance to lay-out work or make a success in business for himself.

For a job in this trade, the worker should be in good enough physical condition to enable him to be on his feet 8 hours a day and to move around considerably. He should also be able to use hands, arms, and eyes constantly.

### *Outlook*

Employment opportunities for journeymen are expected to be very good in most parts of the country during the next few years. Since VJ-day there have been many more openings for inexperi-

enced men than usual. To make up for the wartime deficit in training employers have generally taken on as many apprentices as are permitted by the ratios of apprentices to journeymen established by union agreements, and training opportunities are becoming much fewer.

In the long run, employment in this occupation will no doubt tend to decrease, as it was doing before the war, owing to continued advances in machine typesetting and to other factors. The decline will be slow and will probably not involve many lay-offs. Men in the occupation should have a good chance of holding their jobs indefinitely, especially if they have machine (linotype or monotype) as well as hand skills.

For years, there have been so many small general printing shops that competition for business has been keen in most parts of the country and earnings of shop owners have often been very inadequate. Some veterans and others wishing to

go into business for themselves may, however, find favorable opportunities during the next few years. Those with good all-round civilian experience will have the best chance of success. Men with composing-room skills plus supervisory and managerial abilities will also find some immediate openings in salaried positions with large and well-established firms and, in general, good opportunity for advancement to such positions.

#### *Earnings and Unionization*

Hand compositors are among the better-paid printing-trades workers. Those in newspaper shops tend to have particularly high wage rates—as one can see from the tables on pages 292 and 293, which give the union wage rates in effect in a large number of cities in January 1948.

The great majority of compositors are represented by the International Typographical Union, one of the six major unions of printing workers.

## Linotype Operators

(D.O.T. 4-44.110)

### *Outlook Summary*

Very good employment prospects for skilled men during next few years in country as a whole, but diminishing number of training opportunities. Upward trend in employment expected to continue for some time. Eventually, however, decline in employment is possible, even under favorable general economic conditions.

### *Nature of Work*

Linotypists operate the keyboard of a machine which sets lines of type automatically and much more rapidly than is possible by hand. (The Intertype is a similar machine invented somewhat more recently.) Linotype and Intertype operators are the second largest group of composing-room workers, exceeded in number only by hand compositors. In 1940, about 60,000 were employed; their number is now considerably greater.

Newspaper and job shops are the main employers of linotypists. However, many work for periodical and book plants, and some operators own or are employed in service shops doing machine typesetting for printing firms.

### *How to Enter the Occupation*

A 6-year apprenticeship is required for work in most shops. For the first 5½ years, the training is the same as for hand compositors, but during the last 6 months the linotypist apprentice specializes and receives training in machine work.

High-school graduation is usually required for apprenticeship and is always preferred. Technical training in a printing trade school is desirable. A thorough knowledge of spelling, punctuation, and grammar is especially important, since the worker should be able to catch errors in copy before setting type. Mechanical aptitude is needed to help the linotypist understand the mechanism of his machine and make adjustments.

### *Outlook*

The employment outlook for skilled Linotype (and Intertype) operators during the next few years is good in the country as a whole. There will also be some training opportunities, though not as many as during the first year or two after the war. Top-skilled men, with experience in hand as well as machine composition and with

supervisory and managerial abilities, will find some immediate openings in salaried positions or will have a good chance for advancement to such jobs. Some ex-servicemen and others wishing to go into business for themselves may find favorable opportunities to do so; those with good all-round civilian experience will have the best chances of success.

The long-range outlook, too, is reasonably favorable—more so than for hand compositors, for example. Employment has so far tended to rise over the years and should continue to do so for some time. Eventually, however, technological and other factors may lead to a stable or even a declining trend in employment. On the other hand, printing tends to be less affected by declines in general business activity than does manufacturing as a whole.

#### *Earnings and Unionization*

Linotype operators tend to have much the same rates of pay as hand compositors, as is shown by tables 1 and 2 (on pages 292 and 293). These tables give the union wage rates for both trades in many cities as of January 1948.

The great majority of linotypists are represented by the International Typographical Union.

*See also* Hand Compositors and Typesetters, page 296, and Monotype Keyboard Operators, page 298.

Linotype operator at the keyboard of a linotype machine.

COURTESY OF U. S. GOVERNMENT PRINTING OFFICE



## Monotype Keyboard Operators

(D.O.T. 4-44.120)

#### *Outlook Summary*

Enough jobs for all qualified journeymen in this small occupation during next few years; also a limited number of openings for apprentices. Long-range trend upward.

#### *Nature of Work*

Monotype keyboard and monotype casting machines are used to cast automatically individual letters and other type characters (instead of solid lines, as in linotyping) and to assemble the type automatically. The monotype has a keyboard similar to that of a typewriter, but with some 200 keys. Unlike the linotype, which does the whole typesetting job, the monotype keyboard machine only perforates a narrow roll of paper for use later in the separate casting machine.

The skilled workers who operate the keyboard and make the many different adjustments needed are called monotype keyboard operators (sometimes simply monotype operators). They are a rather small occupational group; only about 6,000 were employed in 1940. The number was probably closer to 8,000 in early 1948. Most of them work for book or periodical houses; some few, for job and service shops.

#### *How to Enter*

A 6-year apprenticeship is required for work in most shops. For the first 5½ years the training is the same as for hand compositors, but during the last 6 months the apprentice specializes and receives training in machine work.

High-school graduation is usually required for apprenticeship and is always preferred. Techni-



cal training in a printing trade school is desirable. A thorough knowledge of spelling, punctuation, and grammar is especially important, since the worker should be able to catch errors in copy before setting type. Mechanical aptitude is needed to help the operator understand the mechanism of his machine and make adjustments.

### *Outlook*

In the country as a whole, qualified journeymen should find it easy to get jobs in this occupation for the next 2 or 3 years. In addition, employers will have some openings for apprentices. The actual number of training opportunities will not be large, however, because the occupation is so small.

The long-range trend in employment is upward in this occupation. Men already in the trade and those who enter it in the near future should have a good chance of holding their jobs indefinitely. Those who are adept in hand composition and

linotyping, as well as in monotype keyboard operation, are likely to have the greatest job security.

The big printing centers will generally offer the most job openings but, at the same time, the keenest competition for employment. In the long run, more and more jobs are likely to be found in smaller cities, to which book and job plants have been moving gradually over the years.

### *Earnings and Unionization*

Wage rates for monotype keyboard operators are generally the same as for linotype operators outside the newspaper industry. Table 2 shows the rates in effect in union shops in a large number of cities in January 1948.

The great majority of monotype keyboard operators are represented by the International Typographical Union.

See also *Monotype Caster Operators*, p. 299, *Linotype Operators*, p. 297, and *Hand Compositors and Typesetters*, p. 296.

## Monotype Caster Operators

(D.O.T. 6-49.310)

### *Outlook Summary*

Good prospects for experienced workers in this small occupation during next few years; also limited number of openings for new workers. Long-range employment trend upward.

### *Nature of Work*

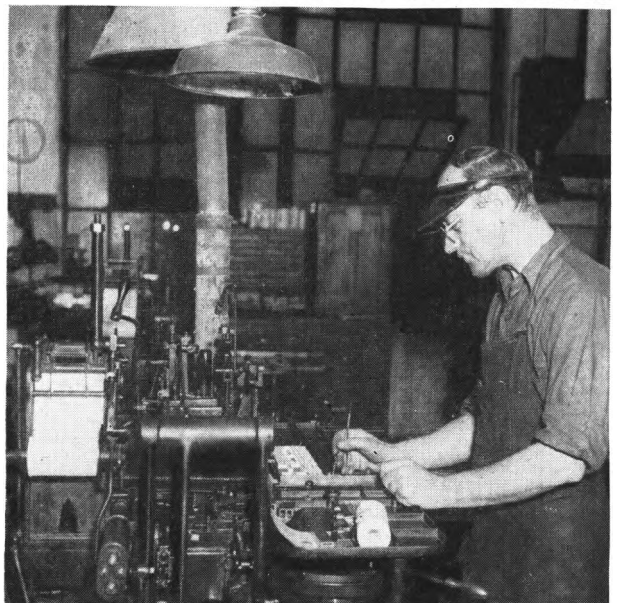
Workers in this occupation operate monotype casting machines, which cast and assemble type automatically, guided by perforations in rolls of paper which have been prepared by monotype keyboard operators (see p. 298). The caster operators not only adjust and tend the machines but usually are required to know the mechanism in order to make repairs. In shops having several casting machines, the operator may supervise unskilled workers who tend the machines.

Up to the present time, only one caster operator has been employed to about every three keyboard operators, taking the printing industries as a whole. The occupation is therefore very small,

employing only about 2,000 workers in 1940 and not more than 3,000 in early 1948. In the main,

Monotype caster operator adjusting position of newly cast type as it comes out of the machine.

PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR



caster operators work for book or periodical houses; a few, for job and service shops.

### *How to Enter the Occupation*

Most newcomers to this occupation learn to operate the machine at a monotype school. Training is then rounded out on the job. This experience is especially needed for the most skilled and best-paying jobs in the occupation, which require an understanding of the mechanism of the caster and ability to make adjustments and repairs. Persons entering the occupation should be physically strong and in good health.

### *Outlook*

Employment opportunities for experienced workers are expected to be good in this occupation, especially during the next few years. Employment is likely to increase at an even faster rate

than among keyboard operators in the near future, and to have a continued upward trend over the long run. There will be more openings for newcomers than before the war, but there is room for only a limited number of new recruits in this small occupation, and competition for jobs is likely to be keen.

### *Earnings and Unionization*

Most monotype caster operators have about the same wage rates as linotypists and monotype keyboard operators outside the newspaper industry (see table 2, p. 293). However, caster operators without responsibility for adjustments or repairs earn less.

The great majority of operators are represented by the International Typographical Union.

*See also Monotype Keyboard Operators, p. 298.*

## Proofreaders

(D.O.T. 1-10.07)

### *Outlook Summary*

Employment expected to rise in this small occupation during next few years, but outsiders will have little if any chance for jobs. Long-range employment trend upward.

### *Nature of Work*

Workers in this occupation are responsible for reading proofs of type set-ups against the original copy to guard against errors in the final printed product. Either the proofreader puts the proof and the copy side by side and reads one against the other, a line at a time, by himself, or he has the material read to him by a copyholder while he follows the proof. Where there are errors, he notes the corrections needed, using standard proofreader's marks. In small shops, journeyman typesetters and advanced apprentices may do the proofreading; in most large shops, however, particularly in the newspaper, book, and periodical industries, there are special proofreaders.

Most proofreaders work in composing rooms of large printing establishments—notably in newspaper, book, and periodical industries.

### *How to Enter the Occupation*

Workers usually enter the occupation from another composing-room job or a front-office job with the same company. A thorough knowledge of grammar, spelling, and punctuation is especially important, since proofreaders must find and correct all errors. The work also requires good hearing and good eyesight.

### *Outlook*

Increased printing activity will mean rising employment of proofreaders in the next few years. Altogether, about 5,000 proofreaders were employed in 1940, including a good many women; the number employed is estimated to be about one-fifth higher now. Though most of the new jobs and jobs arising from turn-over will be filled by workers already in the printing industries, there will be a few openings for veterans and others with experience related to proofreading. Persons completely new to the field will have little if any chance for jobs.

The long-range trend in employment will probably continue to be upward. Those already in the

occupation and those who enter it in the near future should have a good chance of holding their jobs indefinitely.

#### *Earnings and Unionization*

Wage rates for proofreaders in union shops are generally the same as for hand compositors (see

tables 1 and 2). Nonunion shops are likely to have lower rates of pay for proofreaders, particularly women. Furthermore, some union contracts provide lower rates for proofreaders who have never qualified as hand compositors.

*See also:* Hand Compositors and Typesetters, p. 296.

## Electrotypers and Stereotypers

(D.O.T. 4-45.010 and .210)

#### *Outlook Summary*

Enough jobs for all qualified journeymen in next few years; also a limited number of openings for apprentices. Long-range trend slowly upward.

#### *Nature of Work*

Electrotyping and stereotyping are two different processes for making metal press plates from type forms; it is necessary to use such plates when curved plates or a number of duplicate plates are needed. Electrotyping involves making a mold (wax, lead, or other), placing it in a chemical solution, and passing an electric current through it. The result is a metal shell on the back of the mold. This shell, after much further processing, becomes a plate for use in the pressroom. In stereotyping, which is a much simpler process, the mold is made of paper and is used in casting a composition-lead plate.

Journeymen electrotypers and stereotypers must know how to handle all the tasks involved in their respective processes, although in practice they are often assigned to only one phase of the work.

Electrotypers work mainly in large book and periodical plants or shops which service the book and periodical industries. Stereotypers work mainly in newspaper plants or shops servicing newspaper publishers. Some large commercial shops and other kinds of printing plants also use a few men in these occupations.

#### *How To Enter*

To qualify for either job, a 5- or 6-year apprenticeship is usually required. The training is

quite different for each trade; rarely do journeymen change from one occupation to the other.

High school graduation is usually required for apprenticeship and is always preferred. Mechanical training and courses in chemistry and metallurgy are useful.



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Electrotyper placing wax mold on top of type form which is on bed of power molding press.

In workrooms where electrotyping and stereotyping is done, there are frequently fumes and dust and the temperature and humidity are often extremely high. Moreover, the work involves lifting of very heavy plates and type forms. People entering the occupations should be sufficiently strong and healthy to work under these conditions.

*Outlook*

Journeyman electrotypers and stereotypers will generally find it easy to get jobs in the next few years. There will also be some training opportunities, though not as many as during the first year or two after the war. Some men with all-round experience and managerial abilities will be able to go into business for themselves, with fair chances of success. But these are small occupations, employing together roughly 10,000 or so, and the aggregate number of job and business opportunities will therefore number only two or three hundred at best each year.

The long-range trend in employment is upward in these occupations. Men already in the trades and those who enter them during the next few years should have a good chance of holding their jobs indefinitely.

Jobs and business opportunities will seldom be found outside large industrial areas and will be mainly in or around New York, Chicago, Philadelphia, Detroit, and Cincinnati.

*Earnings and Unionization*

Wage rates for electrotypers tend to be higher than those for any other printing trade except photoengravers. Stereotypers, for the most part, have considerably lower pay. The union rates for electrotypers in a number of cities in January 1948 are shown in table 2 on page 293; those for stereotypers in table 1 on page 292.

In both occupations, the proportion of workers unionized—by the International Stereotypers' and Electrotypers' Union (AFL)—is extremely high. This organization is one of the six major unions of printing workers.

## Photoengravers

(D.O.T. 4-47.100)

*Outlook Summary*

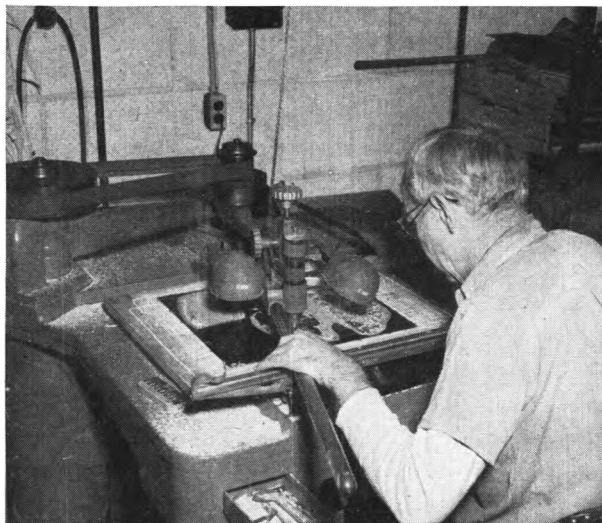
Employment opportunities for qualified journeymen expected to be fairly good in this small occupation in immediate future; some trainee opportunities. Long-run trend in employment very slowly upward.

*Nature of Work*

Photoengravers make copper or zinc plates for use in relief printing of illustrations. The process involves photographing material to be reproduced; transferring (or "stripping") the negative from one glass plate to another; printing from the glass negative onto a metal plate; etching the surface of the metal plate in an acid solution in such a way as to leave the image to be printed in relief; and finally touching up, trimming, mounting, and proofing the plate.

Journeyman must be able to do all operations, and the entire job sometime is done by one man. More often, however, especially in large shops, the work is divided among a number of photoengravers, all craftsmen, who may then be known as photographers, strippers, etchers, finishers (who touch up the plates), routers (who operate the machines which trim off excess metal), blockers (who mount

the engraving on wooden blocks to make them the right height), or provers (who print sample copies on a proof press to see if the plate is satisfactory).



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Photoengraver (router) cutting away metal from nonprinting areas of a plate.

These workers are employed in "service shops" whose main business is making photoengravings for use by others—newspaper plants, book and

periodical houses, and government agencies. Many have their own service shops.

### *How To Enter the Occupation*

A 6-year apprenticeship, including 864 hours of related technical instruction, is commonly required. Apprentices have come mostly from among the high-school graduates whose programs included printing courses. Employers and the union may give some credit for related training and experience in the armed forces.

Photoengravers may transfer to rotogravure (and rotogravure journeymen to photoengraving); usually a probationary period of training and adjusted rates are provided.

### *Outlook*

Employment of photoengravers has been rising steadily since the end of the war and will probably continue to do so in the immediate future.

In 1939, journeymen photoengravers numbered around 10,000, but many were unemployed. There was, on the average, 1 apprentice to every 10 or 12 employed craftsmen, the ratio varying from area to area and shop to shop; some shops offered no training opportunities of any kind.

During the war, a shortage of skilled workers, trainees, and trainee replacements developed, primarily because of selective-service withdrawals and transfers to war industries. To make up for the labor shortage, meet normal replacement

needs, and handle the increasing demand for photoengraving, employers have needed all qualified journeymen who have been available in the postwar period thus far, and many more trainees than usual. The outlook continues to be generally favorable, although reduced apprenticeship opportunities are indicated for the near future. At best, the number of openings for trainees will probably not exceed a hundred or so in the entire country in the next year or two. Some persons wishing to go into business for themselves may find favorable opportunities to do so; generally, those with good all-round experience in the field will have the best chances of success. In the longer run, employment is likely to level off and become fairly stable. Most job and business opportunities—but also the keenest competition—will probably be found in the large cities of New York, Illinois, and Pennsylvania.

### *Earnings and Unionization*

Photoengravers have, on the whole, higher wage rates than any other group of printing craftsmen, with the exception of rotogravure men. Their basic wage rates in a large number of cities in early 1948 are shown in tables 1 and 2 (on pp. 292 and 293).

Photoengravers are almost completely organized by the International Photo-Engravers' Union of North America (AFL), one of the six major unions of printing workers.

## **Rotogravure Photoengravers**

(See D.O.T. 4-47.100)

### *Outlook Summary*

Expanding field, but very small; therefore, few job opportunities at best each year.

### *Nature of Work*

Rotogravure work is a fairly recent development of photoengraving, which so far has never employed more than a few hundred journeymen in the entire country. The process differs from regular photoengraving (in which the image is in relief on a flat plate) in having the image below the surface of a cylinder-plate prepared for use on a rotary press. The operations included in pre-

paring the cylinder-plates used in rotogravure printing are retouching of drawings, paintings, photographs, or other copy to be reproduced (to bring out highlights and shadows), and combining type with the design; photographing the material; transferring the negative onto a copper-plated cylinder; etching in an acid solution in such a way as to cut the image below the surface of the plate; and finally, finishing or touching up the cylinder. In addition, these workers grind off the surfaces of cylinders no longer needed and replating them.

The work is similar in many respects to photoengraving, particularly the photographing, etching, and finishing of the cylinder. As in photo-

engraving, craftsmen must be able to do all the tasks required, though the work is usually divided among a number of workers who may be termed retoucher, photographer, etcher, finisher, or cylinder depositor and grinder.

A few large newspaper and commercial plants have departments which reproduce pictures by this method. However, rotogravure men are employed mainly in independent rotogravure plants. Most of them work for half a dozen big firms which handle a large proportion of all rotogravure work.

#### *How To Enter the Occupation*

A 6-year apprenticeship, including 864 hours of related technical instruction, is generally required. Photoengravers may transfer to rotogravure (and rotogravure journeymen to photoengraving); usually a probationary period of training and adjusted rates are provided.

#### *Outlook*

There has been little room for newcomers as rotogravure photoengravers during the last year or so. During the war, the amount of rotogravure printing was much reduced, and a large propor-

tion of the journeymen and apprentices either went into the armed services or transferred to photoengraving. The volume of rotogravure work has been rapidly returning to prewar levels, however, and there has been frequent need for additional workers. But the openings have been filled in most instances by former workers returning to the trade. On the other hand, since the occupation is expected to go on expanding for an indefinite period, there should be increasing opportunities for newcomers from now on—though only a very few each year, because the total number of men employed is so small.

#### *Earnings and Unionization*

Rotogravure men are among the highest-paid printing craftsmen. In general, their wage scales are above even the high rates for photoengravers doing letterpress work (see tables 1 and 2, pp. 292 and 293).

Practically all workers in this trade are represented by the International Photo-Engravers' Union (AFL), one of the six major unions of printing workers.

*See also* Photoengravers, page 302.

## Lithographic Occupations

(D.O.T. 4-46. and 4-48.050)

#### *Outlook Summary*

Very good employment opportunities for qualified craftsmen and semiskilled workers in next few years; limited number of openings for newcomers. Continued rise in employment in all major occupations expected in long run.

#### *Nature of Work*

Lithography (or offset printing) is one of the three main printing methods. A lithographic plate is smooth or nearly so, with both the image and non-image areas on the same level, instead of on different levels as in letterpress and gravure work. Lithography makes use of the principle that grease and water repel each other. The image areas of the plate are coated with a greasy substance to which the greasy printing ink will adhere.

On the press, the plate is moistened with water before each inking, with the result that only the image areas take up the greasy ink from the inking roller.

In present-day lithographic work the plates are usually made by a photographic process, and the method is often referred to as photolithography. There are, however, a few types of work—posters, for example—in which some of the plates are still made by hand.

The main groups of lithographic workers are the cameramen (who photograph copy to be printed and prepare negatives or positives for use in platemaking); artists and letterers (who retouch negatives, correct colors in the final press plates, draw posters, and do related work); platemakers (who transfer negatives and positives or, less often, hand drawings onto press plates and

prepare these plates for the pressroom); and the pressmen and their assistants (who make ready and operate the presses). There are also a number of other occupational groups—among them, engravers and paper trimmers (or cutters).

Altogether, about 5,000 platemakers were employed in 1946. Pressmen totaled about 3,300 or 3,400, and their assistants about 4,000. Artists and letterers numbered approximately 3,000; cameramen, about 1,200; cutters, roughly 1,000. Their numbers have increased steadily during 1947 and 1948, but are still of the same general magnitudes.

Most workers in these occupations are employed in plants specializing in lithography. However, a good many work in job shops or other letterpress plants which have lithographic departments, or for firms in other industries which do printing of their own by the lithographic process.

#### *Qualifications and Training*

To become an all-round skilled worker in any lithographic department generally requires a 4-year or 5-year apprenticeship covering all phases of the given department's work. Beginners are usually taken on as helpers (or "assistants") and promoted to apprentices after a year or two, if they show promise and there are openings. Less-skilled jobs, such as that of cutter, are generally learned through on-the-job training also, but the training periods are, of course, shorter. Besides on-the-job training many plants give supplementary courses for their workers. Courses in lithography are offered also in trade schools and under other auspices.

A high school education is needed for most jobs. Work in the art, engraving, and camera departments requires natural drawing ability and an eye for color and design, as well as technical ability. In platemaking and presswork, manual dexterity and an interest in chemistry are more important. Men with physical handicaps of many types can qualify for jobs.

#### *Outlook*

Qualified craftsmen should have little trouble getting jobs in lithographic occupations during the years immediately ahead. The labor shortages which developed during the war have been relieved considerably since VJ-day and are no longer general. But this is a fast-growing process, perhaps the most rapidly expanding graphic art.

Employment opportunities will probably be very good also for men with training and experience in semiskilled lithographic occupations. In addition, there will be openings for trainees. However, the actual number of opportunities for newcomers will not be large in any of these small occupations in any one year.

A few men will find favorable opportunities to open their own shops. The chances for success are likely to be greatest in localities which do not already have well-established lithographic businesses.

The long-run outlook is for continued rises in employment in all major lithographic occupations, unless there should be a severe decline in general business activity. Employment is increasing in plants specializing in lithographic work, and a growing number of letterpress plants are setting up lithographic departments. Both these trends are expected to persist. By far the largest numbers of job openings, probably half of the total, will be in three cities—New York, Chicago, and San Francisco—during the next few years. Opportunities will become more and more widespread, however, as time goes on.

#### *Unionization*

The large majority of lithographic workers belong to the Amalgamated Lithographers of America (CIO), one of the six major unions of printing workers.

## Printing Pressmen and Assistants

(D.O.T. 4-48.010, .020, .030, and .060; 6-49.410, .420, and .430)

### *Outlook Summary*

Journeymen pressmen in demand. A good many openings as apprentices and press assistants likely in near future. Long-range outlook good for pressmen; less favorable for press assistants.

### *Nature of Work*

**PRESSMEN.**—Skilled pressmen are the third largest group of printing craftsmen. In 1940, about 33,000 of them were employed; only hand compositors and linotypists were more numerous.

Pressmen's basic duties are to "make-ready" and then tend printing presses while in operation. The object of the make-ready is to insure printing impressions that are distinct and even and neither too dark nor too light; this is done by such means as placing pieces of paper of the right thickness underneath low areas of the press plate or type form and attaching pieces of tissue paper to the surface of the cylinder or flat platen which makes the impression. Pressmen also have to make many other adjustments and may be responsible for oiling and cleaning the presses and making at least minor repairs. In many cases they have assistants whose work they supervise.

The exact nature of pressmen's work varies widely from one type of shop to another, because of the great differences in the kinds and sizes of presses used. Small commercial shops, many of which are owned and run by pressmen themselves in partnership with compositors, generally have small and relatively simple platen (or job) presses that are often fed paper by hand. At the other extreme are the big newspaper plants with their tremendous web-rotary presses, which are fed paper in big rolls and have so many different mechanisms that each press has to be operated by a crew of journeymen and less skilled workers under the direction of a pressman-in-charge. It is customary for pressmen to specialize in operating only one type of press.

**PRESS ASSISTANTS.**—The duties of press assistants range from merely feeding sheets of paper into hand-fed presses to helping pressmen make

ready and operate large and complicated rotary presses. Workers whose main responsibility is feeding are often referred to simply as "feeders."

The nonjourneymen on web-rotary crews in newspaper plants are commonly known as flyboys. They pick up the newspapers as they come out of the press and load them onto hand trucks; they also wheel the trucks out of the pressroom and do other work.

In 1940 the total number of press assistants employed was roughly eight or nine thousand, not counting flyboys in newspaper plants. The ratio of assistants to pressmen varies greatly from one establishment to another, depending on the size of the plant, the type of press used, and other factors. Many shops are too small to have any pressroom helpers.

### *How To Enter*

To become a skilled pressman requires 3 to 5 years of apprenticeship. Usually, men receive training on only one type of press, and opinion differs as to how readily journeymen can become skilled on other types of presses. The length of the apprenticeship and the content of the training largely depend on the kind of press involved.

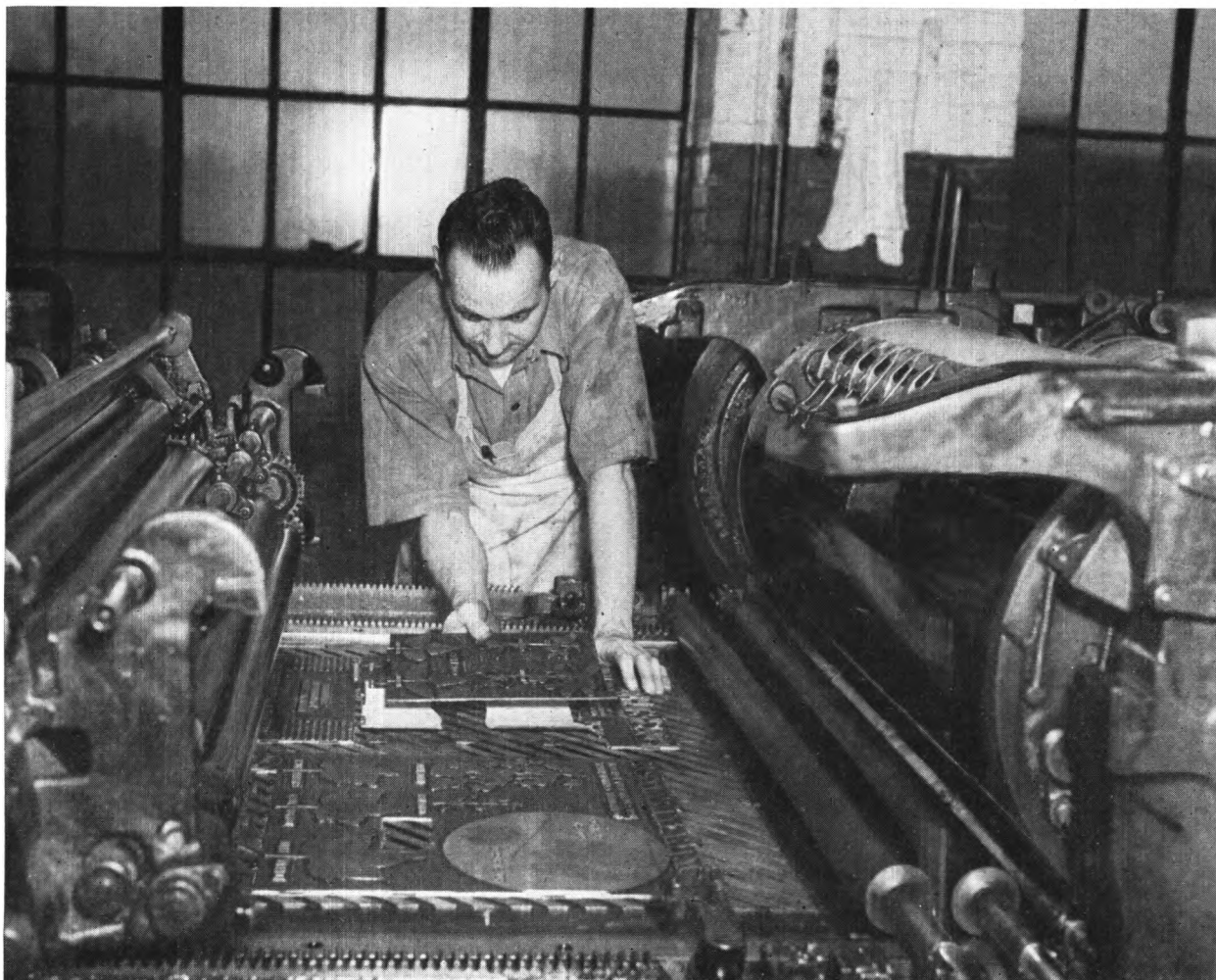
Apprentices are generally chosen from among the press assistants and others already employed by the company. They must have completed at least the eighth grade in school; some employers require high-school graduation. Since they will often have to blend their own inks, a knowledge of color is necessary. Courses in art are therefore very helpful.

Physical strength and endurance are necessary for work on some kinds of presses, where the pressman has to lift heavy type forms and press plates and be on his feet all day. Another quality needed is mechanical aptitude, to assist the worker in making adjustments and repairs to the presses.

### *Outlook*

**PRESSMEN.**—Employment in the occupation will rise considerably in the next few years and probably more slowly thereafter.





PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Pressman using paper to level plate. Press is a small flatbed cylinder press for letterpress printing.

A shortage of both skilled pressmen and apprentices developed during the war. To make up for this shortage, meet normal replacement needs, and handle the actual and anticipated increases in printing of all kinds, the industry has hired many thousands of men for presswork since VJ-day. During the next few years, it will probably continue to require virtually all qualified men likely to be available. In addition, there will be many hundreds of training opportunities.

The long-range trend of employment in the occupation is upward. Technological developments have tended to increase the need for skilled "specialists" on one type of press (as contrasted to the all-round men previously required).

**PRESS ASSISTANTS.**—Several hundred job open-

ings for press assistants may be expected each year for the next few years. After that, openings will probably become much fewer. Before the war, the printing industries tended not to hire as many press assistants as they lost owing to turn-over. It is likely that this tendency will appear again after the current need for labor has been met and that employment in the occupation will resume its long-range downward trend. However, lay-offs will probably be made only in exceptional circumstances.

#### *Earnings and Unionization*

Wage rates for pressmen depend on the make and style of press operated, as well as the type of

printing plant and other factors. Rates tend to be highest in the newspaper industry, as shown by the union wage rates for pressmen in many cities in January 1948 given in tables 1 and 2 (on pp. 292 and 293). Table 2 also shows what the union scales were for press assistants in these cities.

Pressroom workers are usually covered by union agreements. Practically all the letterpress and rotogravure pressmen who are organized belong to the International Printing Pressmen's and Assistants' Union of North America (AFL).

## Bookbinders

(D.O.T. 4-49.010)

### *Outlook Summary*

Many more openings than usual during the next few years for both journeymen and beginners; decreasing numbers of job opportunities thereafter. Long-run employment trend slowly downward.

### *Nature of Work*

Many printing products are finished when they leave the pressroom. This is true of a wide variety of items produced by job shops—business forms, printed stationery, labels, advertising flyers, and so forth. Newspapers, except the few that are bound for libraries, never see a bindery department. Nevertheless, binderies play a part in the manufacture of many items besides books. Whenever a magazine or pamphlet or even a small calendar is sewed or stapled together, this is considered a bindery operation.

Making a book out of the big, flat sheets of paper that come into the bindery from the pressroom is by far the most complicated type of bindery work. The first step is to fold the printed sheets, each of which contains many pages, so that these pages will be in the right order; when so folded into sections of 16 or 32 pages, the sheets are known as signatures. The next steps are to insert any illustrations that have been printed separately, to assemble the signatures in proper order, and to sew them together. The resulting book bodies are shaped in various ways, usually with power presses and trimming machines, and fabric strips are glued to the backs to reinforce them. Sometimes, the edges of the pages are gilded or colored. Covers are glued or pasted onto the book bodies, after which the books undergo a variety of finishing operations and, frequently, are wrapped in paper jackets.

Skilled bookbinders seldom handle all these different tasks, although many journeymen have had training in all of them. Especially in large shops the bookbinders are likely to be assigned to one or a few operations, most often to the operation of complicated machines.



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Bookbinder putting gold lettering on back of book with hand tool.

The majority of journeymen are employed in shops whose main business is bookbinding. However, a good many work in the bindery rooms of large book, periodical, and commercial printing plants. Some are employed in libraries, where the work is done mainly by hand and also differs in other respects from that performed elsewhere.

*Qualifications for Employment*

Completion of a 4-year apprenticeship is usually required of men seeking to qualify as skilled bookbinders. The apprenticeship programs may vary considerably between the different types of shops. Where large quantities of books are bound on a mass-production basis, emphasis is on the most modern machine methods. Where fine hand binding is done, the training is mainly in hand methods, including artistic designing and decoration of leather covers.

*Outlook*

Employment in the occupation is likely to rise in the next few years. Rough estimates suggest that there were in 1939 about 20 to 25 thousand bookbinders. Many were unemployed or could find only bindery jobs paying less than journeyman rates. Now there are probably no less than 30,000 at work, with few if any in nonjourneyman positions; unemployment is at the irreducible minimum that can be expected under even the most favorable circumstances.

To make up for these labor shortages which developed during the war, meet normal replacement needs, and handle the increased demand for bindery services, more qualified journeymen and trainees have been required during the postwar years than for many years prior to the war. The

outlook continues to be favorable. Men with book-binding skills plus supervisory and managerial abilities will find some immediate openings in salaried positions or will have good opportunity for advancement to such jobs.

After several years, openings will become fewer. The long-range employment trend appears to have been downward; there is no evidence that this trend has been reversed.

Most job openings—but also the keenest competition for jobs—will probably be found in large cities, notably in New York, Ohio, Illinois, and New Jersey.

*Earnings and Unionization*

Wage scales in this occupation tend to be below the average for all printing trades. What the union rates were for journeyman bookbinders in many cities in January 1948 is shown in table 2, page 293.

Although employees in binderies are not as highly organized as other groups of printing workers, many skilled bookbinders are represented by the International Brotherhood of Bookbinders (AFL), one of the six major unions of printing workers. A higher proportion of journeymen than of nonjourneymen bindery workers belong to this union.

*See also: Bindery Workers, page 309.*

**Bindery Workers**

(D.O.T. 6-49.000 to .199)

*Outlook Summary*

Substantial numbers of openings likely for another year or two; fewer opportunities thereafter. Long-run trend in employment upward.

*Nature of Work*

In many binderies, especially large ones, a great part of the work is done by employees trained in only one operation or in a small group of related tasks, rather than in all tasks like many journeyman bookbinders. These semiskilled workers are mostly women, though a few are men. The women handle a variety of hand and light-machine operations—such as hand folding, pasting in of inserts,

assembling signatures by hand, machine sewing, gluing fabric reinforcements on signatures, and feeding machines. The men are usually assigned to more intricate machine jobs; they may operate assembling, trimming, stamping, and many other types of machines.

Bindery workers are employed mainly in independent binderies, bindery departments of large printing firms, libraries, and Government agencies.

*Training*

A training period of 1 or 2 years is frequently required. In union shops there are always formal training programs.

*Outlook*

Employment has risen considerably since VJ-day and continued substantial gains are likely for another year or two. In 1939, roughly 70,000 to 80,000 bindery workers were employed; many were unemployed. During the war, however, a shortage developed mainly because of the competition for labor from war industries and because of withdrawals to the armed services. To make up for the shortage, meet normal replacement needs, and handle the increases in bindery work, employers have required increasing numbers of experienced workers and many more newcomers than usual since mid-1945.

After the next few years, openings will probably become fewer and there may not be jobs for all those seeking work. But the long-range trend in employment is upward, and workers who now have jobs or get them in the immediate future have a good chance of holding their positions, unless there should be a sharp decline in general business activity.

Jobs will be found in most sections of the country. But the greatest number of openings—also the most competition for them—will be in the large cities in New York, Ohio, New Jersey, and Illinois.

*Earnings and Unionization*

Women bindery workers have the lowest wage rates of any group of production workers in the printing and allied industries. Table 2, page 293, shows the union scales in effect for these workers in many cities in January 1948.

Men doing semiskilled machine work are generally paid somewhat more than the usual top rate for women. The few doing hand operations have rates similar to those for women workers.

Although employees in binderies are not so strongly organized as other groups of printing workers, many bindery workers are represented by the International Brotherhood of Bookbinders (AFL), one of the six major unions of printing workers.

*See also:* Bookbinders, page 308.

# *Furniture Manufacturing Occupations*

## *Major Branches of the Industry*

Furniture covers a wide range of products—everything from a complete suite of furniture to decorative gadgets. The branches of the industry which make upholstered and wooden (unupholstered) furniture for the home are the two most important. A third branch includes plants which make wood office furniture and store fixtures. (Workers in plants making metal furniture either for the office or home are not included in this report, since the occupations are quite different, being metalworking rather than woodworking occupations.) Finally, there are workers in the countless small retail upholstery shops throughout the country who handle repairs and sometimes make custom furniture.

## *Processes and Occupations—Wooden Furniture*

Most furniture production is carried on in factories using mechanized, mass-production methods.

This development has greatly affected the kinds of workers needed in furniture production. Nowadays relatively few of the all-round furniture workers such as cabinetmakers and furniture finishers are employed. A large number of different kinds of semiskilled workers who specialize in particular operations have taken the place of the all-round furniture makers. The actual production of the furniture is carried out by three groups of workers—woodworking machine operators, assemblers, and finishing-room workers. Cutting and shaping of the furniture parts is done in the woodworking department by such workers as cut-off saw operators and shaper operators. The parts then go to the assembly department where specialized workers including chair makers, door hangers, and base-assembly men put the furniture together. After the furniture is assembled, it is finished off by sanders, rubbers, painters, and similar workers in the finishing department.

## *Processes and Occupations—Upholstered-Furniture Plants*

In plants turning out upholstered household furniture, the nature of the work is quite different. Upholstering furniture consists primarily of attaching springs to a frame, covering the springs with filling materials and stretching a fabric cover over the foundation. But upholsterers usually no longer do many of the incidental tasks. Job simplification has resulted in less skilled workers taking over parts of the job, i. e. webbers to tack the webbing and spring setters to install the springs. Furthermore, where the upholsterer formerly covered all of a piece or suite of furniture by himself, in many plants the work on a piece of furniture is now further divided so that one upholsterer works only on the seat of a sofa, another on the arms and wings, etc.

## *Employment*

In the fall of 1947, there were about 180,000 workers employed in household-furniture plants, including upholstered-furniture factories and some making metal household furniture. This figure does not include the workers in small custom shops and repair shops. Something over 30,000 were engaged in woodworking-machine operations mentioned above and there were more than 20,000 assemblers and 10,000 finishing-room workers. Another 25,000 to 30,000 employees worked in upholstery departments as cutters, sewers, webbers, upholsterers, etc. Still another sizable number were the helpers—the largest single group in furniture manufacture. Many of the remainder were in maintenance, shipping, supervisory, and materials-handling occupations.

## *Outlook*

The future for furniture manufacture—and the furniture worker—looks good, both for the next

few years and for the long run. More than many other industries, this industry does particularly well under good general business conditions such as have prevailed throughout the country during the first postwar years. Then, too, there has been a backlog of demand which began to accumulate during the war and although it has been obscured in part by recent consumer resistance to ever-mounting prices, its effect is by no means exhausted. Finally, manufacturers are confident that once the construction of new homes reaches full stride it will be followed, as it always has been in the past, by a wave of purchases of new furniture which will continue for several years. It should be noted that, because of the sensitivity of furniture sales to business conditions, when slumps occur, opportunities in this industry are seriously affected. If people have limited incomes, furniture purchases are among the first to be put off.

### *Major Regions*

Three regions, the Great Lakes, Southeast, and Middle Atlantic regions stand out as principal areas of furniture manufacture. Three-fourths of the industry is concentrated in nine States: North Carolina, Illinois, Indiana, New York, Pennsylvania, Virginia, Michigan, California, and Ohio—ranked roughly in order of their importance.

### *Earnings*

Taken as a group, workers in the furniture industry averaged \$1.12 an hour in September 1947. Straight-time earnings would average somewhat less, since some overtime work is reflected in this figure. Wages for workers directly engaged in production usually range from about 75 cents to \$1.50 an hour depending on the job and the locality.

## Cabinetmakers

(D.O.T. 4-32.100)

### *Outlook Summary*

Only a few cabinetmakers are now employed in the industry and any additions there are unlikely. A limited number may find jobs in small custom plants or repair shops.

### *Nature of Work*

The cabinetmaker makes high-grade wooden furniture for the home, office, and store. He uses a saw, plane, chisel, and other hand tools and wood-working machines to cut and shape each of the parts and assembles them into an article of furniture following specifications detailed in blueprints and drawings. A 3- to 4-year period of training or apprenticeship is necessary to learn the job.

### *Where Employed*

All-round cabinetmakers in the furniture industry have almost disappeared because with the modernization of the industry their work has been successfully broken down and different parts of the job assigned to machine-room workers. Most of the workers employed nowadays in the cabinet room of a furniture plant are not cabinetmakers



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR  
Cabinetmakers are employed mainly in repair shops or in small shops which make custom furniture.

but assemblers who, except in key occupations, are semiskilled workers. Cabinetmakers, however, are

still employed wherever custom furniture is manufactured and in retail shops where they repair furniture and occasionally make new pieces.

### *Outlook*

Almost no additional cabinetmakers will be hired in the furniture industry, despite the fact that the production of furniture will probably be higher for several years than any time since the peak in the 1920's. Various types of furniture assemblers—chair makers, case clamp men, case fitters, drawer makers, frame makers, etc.—have long since taken over the work of the cabinet-

maker. Relatively few cabinetmakers are employed nowadays and they work in plants where, because of the feasibility of manufacture along craft lines, or because of the kind of product, job specialization does not occur. The comparatively few additional cabinetmakers needed in the next 5 or 6 years will be employed in such factories or in small custom plants and repair shops scattered throughout the country.

*See also:* Furniture Woodworking Machine Operators, page 314, and Furniture Assemblers, page 315.

## Wood Turners (Furniture)

(D.O.T. 4-33.363)

### *Outlook Summary*

Very few additional skilled wood turners (hand) can be employed. Most wood turning nowadays is done by less-skilled automatic lathe operators.

### *Nature of Work*

A chair leg or arm, such as is seen on Chipendale or other period furniture, a curved and rounded porch column or stair spindle, or a baseball bat is the product of wood turning. The wood turner presses hand-held cutting tools against the wood stock, which is on a rotating lathe. He must use skill and dexterity, both in the free-hand direction of the cutting tool and in turning the different kinds of wood.

The wood turner learns his trade during a 3- to 4-year period of training, and perfects his ability through years of woodworking experience.

### *Outlook*

In most plants this trade has been mechanized for many years and automatic lathes instead of hand lathes are used. In October 1945, a total of about 400 men were employed as automatic lathe operators in the furniture industry on machines which they set up and operated. Only an extremely small number of the skilled hand wood turners are employed in manufacturing furniture. Prospects for additional skilled hand wood turners are very limited because workers on automatic lathes supply most of the turned products needed.

## Wood Carvers and Spindle Carvers

(D.O.T. 4-33.361, .362)

### *Outlook Summary*

A very small number of additional skilled carvers can be used, despite good outlook for furniture manufacturing generally.

### *Nature of Work*

The wood carver uses various carving knives, chisels, and other hand tools to cut designs and

figures into the surface of wooden furniture, mantelpieces, panels, and staircases. The spindle carver cuts similar designs and figures, usually into smaller pieces of wood stock such as chair arms and legs and furniture panels, by pressing and guiding the face of the stock against the rapidly rotating cutter on the end of a spindle. There is no significant difference in the training and experience in the two jobs for, although the use of power-

driven cutters speeds up the work, dexterity, and judgment are still essential. In some work carvers trace or draw the outline of the design on the wood, while in others the carver works freehand without a pattern.

Carvers usually learn their trade during a 3- to 4-year training period. Emphasis during training is placed on an understanding of freehand drawings and blueprints.

### *Outlook*

While the demand for the products of both the furniture and woodworking industries will be much greater during the next several years than it was during the prewar period, there will be no proportionate increase in the use of the carver's services. Hand carving is generally employed only where higher-priced furniture or other custom items of wood are manufactured. It is estimated

that there were fewer than 500 single-spindle carvers in furniture plants in October 1945, and only very few hand carvers. Decorative scroll work and other furniture carvings have declined in popularity in the past several years and fewer carvers have been needed. In addition, both the furniture and woodworking industries, in developing mass-production techniques, have installed automatic carving machines with multiple spindles which carve from 1 to 10 pieces of wood simultaneously. The operator of such machine not only displaces several skilled carvers but is not required to possess the same dexterity or judgment in his work. Even in highly-mechanized factories where automatic carvers are used, unless period furniture is one of the major items, there is relatively little demand for carving work.

Job opportunities for additional hand or single-spindle carvers will be extremely limited.

## Furniture Woodworking Machine Operators

(D.O.T. 6-33.111, .211, .214, and .364)

### *Outlook Summary*

Numerous openings for woodworking machine operators for several years; thereafter opportunities limited mainly to replacement needs.

### *Nature of Work*

Most modern furniture factories have developed mass-production methods, and large quantities of identical pieces of furniture are produced daily. The first part of what used to be the all-round cabinetmaker's job—cutting and shaping wood into furniture parts—is now usually carried on by various workers in the machine room. First the lumber is ripped and cut on power saws into specified dimensions. Then the pieces are sent on to different workers, each stationed at a machine, to be trimmed and shaped.

A small number of skilled woodworkers who use hand tools, such as the carver and the woodturner, are still employed in some mechanized woodworking departments of modern factories. But workers who tend automatic machines have, by and large, taken the place of these craftsmen.

A great many of such less-skilled, specialized workers nowadays are employed in the woodworking room. Each of the machines, and usually, therefore, each worker, performs a single operation in cutting and shaping the parts which will later be assembled into the final product. For instance, there is a boring machine which only bores holes into the pieces of wood. Another machine is set up to cut tenons into the wood for joints, while still another cuts the mortise into which the tenon fits. Other machines sandpaper the wood, trim it, or carve it.

The workers who operate the machines are usually identified by the names of the machines they run. For instance, among the workers are belt and drum sanders, boring-machine operators, and cut-off and rip-saw operators. Also known by their machines are the planer operators, shaper operators, and turning-lathe operators, and the multiple-spindle carvers.

### *Training*

Most woodworking machine operators learn to do their work in a few weeks. The most complex



job requires no longer than a few months. As a rule, a new employee in the department is assigned to a job as helper, or trained on one of the simplest operations, then advanced to other jobs as openings occur.

#### *Where Employed*

The wood and upholstered household furniture plants employing woodworking machine operators are concentrated in a number of major furniture producing centers. The most important ones include High Point and other towns in North Carolina; New York City and Jamestown, N. Y.; Martinsville, Va.; Gardner and Fitchburg, Mass.; Chicago, Ill.; Grand Rapids, Mich.; Jasper and Tell City, Ind.; and Los Angeles, Calif.

#### *Outlook*

The woodworking machine operators are the backbone of the labor force of the furniture industry and, with the expected increase in furniture employment in the next several years, represent by far the best opportunity for employment in the average furniture plant. In 1947 there were well over 30,000 such workers, making up a larger proportion of total employment than any other similar group of workers such as the furniture assemblers. Although employment gains will slacken off after the next several years, openings because of retirements and deaths may average as many as 500 jobs

each year. In addition, the number of workers who quit to work elsewhere or are promoted to better jobs considerably enhances chances for a job as a replacement.

#### *Earnings*

Recent earnings information is not available for all the different kinds of woodworking machine operators. The average straight-time hourly earnings in September 1947 of male workers in three typical woodworking machine jobs—belt sanders, cut-off saw operators and shaper operators—are shown below for some of the important furniture-producing areas.<sup>12</sup>

Area	Belt sanders	Cut-off saw operators	Shaper operators, hand (set-up and operate)
Chicago, Ill.—Gary, Ind. ....	\$1. 16	\$1. 12	\$1. 31
Fitchburg, Mass. ....	1. 01	. 95	1. 06
Grand Rapids, Mich. ....	1. 22	1. 18	1. 33
Jamestown, N. Y. ....	1. 21	1. 04	1. 13
Jasper—Tell City, Ind. ....	1. 06	. 97	. 99
Los Angeles, Calif. ....	1. 36	1. 43	1. 58
Martinsville, Va. ....	. 95	1. 02	1. 02
Morganton—Lenoir, N. C. ....	. 95	1. 05	. 98
Winston-Salem—High Point, N. C. ....	. 84	. 86	. 93

<sup>12</sup> Wood furniture, excluding upholstered.

## Furniture Assemblers

(D.O.T. 6-36.010 to .130)

#### *Outlook Summary*

Rising trend of employment in next several years; over longer run many openings to fill replacement needs.

#### *Nature of the Work*

As mentioned earlier, one of the main results of advancing technology in furniture manufacture has been the virtual disappearance of the old-time cabinetmaker—at least in furniture factories. The part of his work that involved putting the furniture together after the parts had been shaped by machine or by hand is done nowadays by special-

ized assemblers who, in different sections of the country, are called cabinet room assemblers, assembly room workers, or furniture assemblers. Depending upon the type of product made, and the degree of specialization in the particular factory, one worker may assemble one product by himself—chair makers, table assemblers, bed makers, etc. On the other hand, he may be part of a group, or he may work in a production line, in which case his job is to assemble only some piece of the final product. Typical of the latter are the door hangers, back makers, base-assembly men, drawer makers, drawer slide assemblers, upfitters (who attach hardware and trim) and a great many others.

*Training*

None of the assembly-room jobs—except that of the foreman—is skilled in the sense that the cabinetmaker's job was. They require, at the most, only a few months' training to develop the necessary skill and proficiency. Once the worker gets the hang of how furniture is assembled, he can move about from one job to another without much additional training.

*Where Employed*

The wood and upholstered household furniture plants employing furniture assemblers are concentrated in a number of major furniture producing centers. The most important ones include High Point and many other towns in North Carolina; New York City and Jamestown, N. Y.; Gardner and Fitchburg, Mass.; Martinsville, Va.; Chicago, Ill.; Grand Rapids, Mich.; Jasper and Tell City, Ind.; and Los Angeles, Calif.

*Outlook*

The number of furniture assemblers in household furniture plants has increased steadily over the past few decades. By 1947 something over 20,000 such workers, in various assembly specialties, were employed throughout the industry. More jobs will be created not only by the expected expansion in furniture production, but because of

continued specialization, which has not yet reached its peak. After several years the number of additional jobs will be less plentiful, but deaths, retirements, promotions, and transfers to other industries will result in an average demand for over 500 replacements each year.

*Earnings*

Recent earnings information is not available for all the different kinds of furniture assemblers. The average straight-time hourly earnings in September 1947 of male workers in two typical assembly jobs—case-clamp men and chair makers—are shown below for some of the more important producing areas.<sup>13</sup>

Area	Case-clamp men	Chair makers
Chicago, Ill.—Gary, Ind.-----	\$1. 22	\$1. 23
Fitchburg, Mass.-----	1. 01	1. 01
Grand Rapids, Mich.-----	1. 38	1. 23
Jamestown, N. Y.-----	1. 44	-----
Jasper-Tell City, Ind.-----	1. 21	1. 11
Los Angeles, Calif.-----	1. 34	-----
Martinsville, Va.-----	. 96	. 94
Morganton-Lenoir, N. C.-----	. 89	-----
Winston-Salem-High Point, N. C.-----	. 85	. 79

*See also* Cabinetmakers, p. 312.

<sup>13</sup> Wood furniture, excluding upholstered.

## Furniture Finishers

(D.O.T. 5-16.710 to .799)

*Outlook Summary*

Only a limited number of all-round skilled finishers are now employed in the industry.

*Nature of Work*

The finisher applies successive coats of stain, sealer, filler, and lacquer or varnish to the surface of wooden furniture, smoothes the surface between coats, and rubs down the final coat to a satin finish with pumice, or wax and a buffing cloth. The finisher can prepare necessary formulas for the stain, shellac, and varnish necessary to get the desired

color and luster. On repair work in a factory or repair shop he develops special skills in the use of putty and filling sticks and in matching the stain, high-lighting, graining, or inlay of the surrounding undamaged area.

Considerable experience is necessary before a man is a competent finisher and a 3-year on-the-job training or apprenticeship is usual in this craft.

*Where Employed*

Although the large furniture manufacturing States are New York, Illinois, Michigan, North

In the finishing department, paint is usually applied with a spray gun.

PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR



Carolina, Massachusetts, Ohio, Indiana, and Pennsylvania, the finisher finds work in all parts of the country. Repair shops and small custom furniture plants, which afford the best opportunities for all-round finishers, are located for the most part in large cities.

### *Outlook*

With increased job specialization the all-round finisher has been almost completely supplanted in the larger, more modern factories. Less skilled workers smooth the surface of the furniture and move it on to other workers who apply filler, stain and oil, and varnish or lacquer, and rub down the finish. Only a small number of all-round finishers, often classified as foremen or repairmen, are currently employed in the industry.

The outlook for an additional number of such workers is poor. Furthermore, as openings occur, the specialized workers will be upgraded and thus most of the existing openings for all-round finishers will be filled from among their ranks.

## Furniture Finishing-Room Workers

(D.O.T. 7-16.111 to .122)

### *Outlook Summary*

Considerable number of openings for finishing-room workers for the next few years; opportunities thereafter mainly for replacements.

### *Nature of Work*

In many furniture plants—especially the larger, more modernized factories—the finishing process is broken down into several stages instead of being performed by skilled all-round furniture finishers. Each part of the work is performed by specialized workers. For practical purposes the furniture finishing is divided into three phases of work: (1) Cleaning and sanding the surface, (2) coating the furniture, and (3) rubbing and polishing the finish.

The surface of a piece of furniture must be lightly sanded and rubbed down with abrasives before the application of each type of finishing material. In factories where the work is greatly specialized, workers who use sand or emery paper,

or steel wool are known as hand sanders. Those who smooth the surface after the putty and filler are applied are known as putty men and filler wipers. The men who clean the surface after it has been stained are known as stain wipers.

The next group of workers apply paint, varnish, lacquer enamel, etc., to the surface of furniture. These men work with either a brush or spray gun, sometimes with both. In the manufacture of some expensive grades of furniture, less skilled workers are employed to do the rough work and more highly skilled painters do the final, decorative work. In such cases the more highly skilled painters, varnishers, or whatever they might be called in a particular plant, can be likened to all-round finishers. They work on a variety of products where different finishes are called for, and often select and mix the paints used. In some factories, glazers, blenders, and high-lighters do special work such as shading stains and colors.

When the filling, sanding, etc., are completed, rubbers polish the furniture. Hand rubbers work

with a cloth or felt pad dipped in a mixture of pumice stone and oil, or else they apply wax and rub it in with steel wool. The machine rubbers use a portable rubbing machine to rub in the polishing compound and lubricants.

### *Training*

Finishing-room workers are generally considered semiskilled, and most of them learn these jobs in a relatively short time, from a few weeks up to several months. Usually the worker begins as a helper, or on one of the easier jobs in the finishing department, and is advanced to more difficult operations as openings occur.

### *Where Employed*

The wood and upholstered furniture plants employing finishing-room workers are concentrated in a number of major furniture-producing centers. The most important ones include High Point and other towns in North Carolina; New York City and Jamestown, N. Y.; Martinsville, Va.; Gardner and Fitchburg, Mass.; Chicago, Ill.; Grand Rapids, Mich.; Jasper and Tell City, Ind.

### *Outlook*

Like the other semiskilled jobs in furniture plants, the number of finishing-room workers has increased rapidly in the past 20 years. By 1947 well over 10,000 were employed in the finishing departments of furniture plants throughout the country. With the expected increase in furniture

manufacture, there will be openings for a considerable number of newcomers.

After the next few years the demand for additional workers will let up, but replacing those who leave their jobs for one reason or another will create some opportunities for newcomers in finishing departments. Replacements for deaths and retirements alone might average as high as 200 a year.

### *Earnings*

Recent information is not available on the earnings of all the different kinds of finishing-room workers. The average straight-time hourly earnings in September 1947 of male workers in two finishing-room jobs—hand rubbers and hand sanders—are shown below for the more important furniture areas.<sup>14</sup>

Area	Rubbers, hand	Sanders, hand
Chicago, Ill.—Gary, Ind.-----	\$1. 15	\$1. 06
Fitchburg, Mass.-----	1. 04	-----
Grand Rapids, Mich.-----	1. 25	1. 06
Jamestown, N. Y.-----	1. 33	1. 22
Jasper—Tell City, Ind.-----	1. 33	1. 04
Los Angeles, Calif.-----	1. 30	1. 16
Martinsville, Va.-----	. 75	. 79
Morganton—Lenoir, N. C.-----	. 80	. 79
Winston-Salem—High Point, N. C.-----	. 76	. 73

<sup>14</sup> Wood furniture, excluding upholstered.

## Upholsterers

(D.O.T. 4-35.710 and .720)

### *Outlook Summary*

Field is likely to be crowded for the next 5 or 6 years. Many newcomers have recently entered training for the trade.

### *Nature of Work*

The work involved in upholstering furniture consists of several distinct steps. The first job is to fasten in the canvas webbing, tie in the springs if any are used and cover this foundation with

fabric. Then various filling materials, such as cotton batting, kapok, animal hair, or sponge rubber are laid over the covered foundation. Finally, burlap canvas is tacked over the padding and the upholstery fabric is cut and tailored to fit. Because much of the work can be separated into different tasks, the upholsterers often do only the final tailoring and the other parts are taken over by less-skilled workers, i. e., webbers to tack in the webbing, and spring setters (or "tiers") to install the springs.

Many plants in addition have further divided the upholsterer's work so that he specializes in covering sofa seats, for example, while another covers the arms and wings, and so on. While one upholsterer formerly covered an entire piece of furniture or even a complete suite by himself, nowadays the chances are that if he works in a regular plant, the upholsterer is a specialist. However, in the small retail upholstery shops which do repair work and occasionally custom upholstering, the all-round upholsterer still does all the work himself.

### Training

A 2- to 4-year training period is necessary to become an all-round upholsterer. Sometimes a formal apprenticeship is arranged, but often the skill is acquired through informal on-the-job training.



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Springing up a chair is one of the early steps in upholstering. Sometimes specialized workers do this job.

### Where Employed

There are currently 8,000 to 10,000 upholsterers employed in furniture manufacturing in addition to those who upholster seats in automobiles and railroad coaches, or work in department or furniture stores and retail shops. The number of upholsterers working elsewhere—mostly in the many retail shops—is much larger than the furniture

industry employs. The bulk of the upholstered furniture industry is located in New York, Illinois, California, North Carolina, Ohio, and Massachusetts. Large cities are centers for shops which do custom and repair work, and many additional shops may spring up since it usually takes less than \$2,000 to open such a business.

### Outlook

Although the peak may be reached by 1948 or 1949, furniture sales will remain high for several years because of the volume of pent-up demand and the continuing number of new homes to be furnished. Beyond this, furniture sales depend primarily on business conditions throughout the Nation. New families are always furnishing homes, but there is comparatively little outlay for new furniture during periods when incomes are low. Furniture is reupholstered instead, but activity even in this line depends on purchasing power in the consumer's hands. In addition, current information indicates that many veterans have begun training to be upholsterers. Competition for the few jobs likely to open up in the near future will be very keen and an oversupply of upholsterers is a strong possibility.

### Earnings

Straight-time average hourly earnings of upholsterers in September 1947, in plants manufacturing upholstered furniture in the four most important areas, were as follows:

	Chicago	Los Angeles	New York City	Winston-Salem-High Point, N. C.
Upholsterers.....	\$1. 69			
Upholsterers, chairs.....		\$2. 70	\$2. 19	\$1. 14
Upholsterers, complete work.....		2. 24	2. 27	1. 38
Upholsterers, section work.....		1. 83	2. 18	1. 22

<sup>1</sup> Information cannot be presented by type of work.

Upholsterers in retail and custom shops are usually paid a weekly wage or salary. In many of the retail shops the owner does the upholstering.

# *Fur Manufacturing Occupations*

At one time the whole process of manufacturing fur garments was carried on by furriers, skilled craftsmen who tanned and dyed the furs, and sewed them together into fur garments. Nowadays the different steps in the process are usually handled by specialists. Fur dressing and dyeing plants employ fleshers and blenders to prepare the furs for further use. Fur-garment manufacturing plants employ such skilled craftsmen as cutters and finishers, and other semiskilled workers to make up the furs into finished coats and other garments. Some fur coats are still made by retail custom furriers, but most are made by manufacturing establishments which sell their output to stores. All-round furriers are employed in retail shops to do custom work and to repair and remodel fur garments.

Most of the fur dressing and dyeing and the manufacture of fur garments is carried on in small establishments located in New York City, which is the recognized center of the fur industry. Retail fur shops and department stores employing furriers are found in localities all over the country, but most of them are located in northern areas.

Fur work has usually been subject to seasonal ups and downs because most people buy fur coats in the period between August and the end of January. Fur employment reaches its peak in the fall, and in most years there has been widespread unemployment of fur workers in the first few months of the year. Fur manufacturing is also greatly affected by changes in general business activity. Fur garments are greatly in demand in prosperous periods, but sales fall off very sharply when slumps occur.

## **Fleshers (Fur Dressing)**

(D.O.T. 7-13.712)

### *Outlook Summary*

In the long run, employment should be steadier than it has been in the past. For the most part, openings in the next few years limited to replacements for those who leave the trade.

### *Nature of Work*

The flesher pulls fur skins back and forth across a stationary knife or a revolving blade, to scrape from the inside of the pelts the thin film of tissue which must be removed to allow the tanning chemicals to work efficiently. Fleshing is a very delicate operation—one that requires considerable skill and dexterity. Any excessive pressure on the keen-edged flesher's knife will cut through the hair roots embedded in the skin and damage the fur. Except for the substitution of

the revolving blade for the stationary knife to facilitate the handling of some of the cheaper skins, fleshing has not changed much since ancient times. From time to time fur dressers have experimented with the use of automatic fleshing machines. But manual methods—calling for a high degree of skill—are still in general use, and are likely to continue, since many types of skins cannot be fleshed by machine without injury to the fur.

### *Where Employed*

Fleshers work for fur dressers, or fur dressers and dyers, nearly all of whom are located in New York City and vicinity. Over 90 percent of all furs are dressed and dyed in the New York City area, the remainder in St. Louis, Chicago, and other cities where there is sufficient fur-trading.

*How to Qualify as a Flesher*

There is no organized apprenticeship system in the fur dressing and dyeing industry, but in order to qualify as a journeyman, the flesher must have several years of training on the job. It is difficult, however, for newcomers to get training and experience in this trade, since the union to which fleshers belong, the International Fur and Leather Workers (CIO), limits the number admitted to membership. This policy was adopted by the Union because the trade is small and easily overcrowded and because the unstable and seasonal nature of the industry has resulted in unemployment and low incomes for fur workers in less prosperous times.

*Outlook*

During the next few years not many fleshers will be needed in addition to the estimated 2,000 now employed. As long as times are prosperous, fur dressers will continue to do a good business and there will be plenty of work for those already in the industry. However, any further expansion is unlikely.

The long-range employment outlook for fleshers is affected by the ever-increasing manufacture of less expensive fur coats, which has broadened the market for furs by including consumers with lower incomes. Further advances in the processing of inexpensive furs will take a larger part of the fur industry out of the luxury category, and thereby tend to stabilize employment in an industry that has been subject to extreme fluctuations.

*Earnings*

Fleshers are paid piece rates—the amount depending on the type of fur—but are guaranteed a minimum wage which amounted to \$1.50 per hour (\$52.50 for a 35-hour week) in union shops in the early part of 1948. However, the average wage greatly exceeds the minimum, and some fleshers receive as much as \$175 per week during the busy season. In all but very prosperous times, annual earnings in fur dressing and dyeing have not been unusually high because the work is highly seasonal. Fleshers usually work part time during the slack season, dividing among themselves what little work there is in the shop.

**Fur Blenders**

(D.O.T. 7-18.921)

*Outlook Summary*

Openings for new workers limited to a small number of replacements for those who leave the occupation from time to time. No increase in employment expected over longer run.

*Nature of Work*

Blenders dye furs by hand, using feathers or very fine brushes. In the most common type of blending, called "feathering," the blender dips his feather into a pot of dye and strokes it lightly across the tips of the long overhair until the desired depth of color is obtained. Pale or off-color pelts of high-priced furs such as sable, marten, fisher, and mink are feather-blended to make them look the same as better-colored skins. Feather-blending is also used to simulate the characteristics of rare furs in cheaper skins. Striping—the ruling in of lines on a fur coat with a brush—is an

other form of blending. Muskrat, rabbit, marmot, and other less costly furs are striped to imitate such furs as sable and mink.

Formerly all furs were dyed by hand. Ground-dyes were brushed over the entire surface of the coat and pounded into the fur with especially adapted beating brushes. Now, since the development of dyes that are not harmful to the leather, many different types of furs are vat-dyed—that is, simply immersed in a vat filled with dyestuff. Then too, there are brushing or "topping" machines which apply top-dyes mechanically. However, in spite of these developments, a great many furs still require the individual attention and careful treatment that can be given only by the blender's skillful hands. In this category are the luxurious furs such as mink and sable, and the excellent imitations of these furs created from cheaper skins.

*Where Employed*

All blenders work in fur dressing and dyeing plants. Almost all of the jobs are within the metropolitan area of New York City or in nearby New Jersey. About 90 percent of all furs are dressed and dyed in this vicinity.

*How to Qualify as a Blender*

Blenders are usually recruited from the ranks of unskilled or semiskilled workers in the blending department or dyehouse. Beginners receive a learner's wage until they become recognized as full-fledged blenders, but there is no formal apprenticeship. The trade is difficult to enter. Because the fur dressing and dyeing industry is small and its activity seasonal in nature, the union to which blenders belong, the International Fur and Leather Workers (CIO), seeks to prevent overcrowding and unemployment by limiting the number of members going into blending work.

*Outlook*

The outlook for fur dressing and dyeing is tied up directly to the number of fur coats and accessories which fur garment manufacturers will turn

out. Since the dressers and dyers don't expect to do any more business than they did during the booming war years, the prospects of their needing many additional workers are not very good. Replacements will be needed from time to time for blenders who drop out of the trade because of death or retirement. But since the craft is quite small—somewhere around 1,000 workers—the number of future replacements will be limited.

Since most of the blender's work is on luxury products, his job is less certain than that of his fellow-craftsmen. He has plenty of work at present because the bulk of the trade is turning out better-grade fur garments. But a depression would mean a shift to relatively cheap furs, mostly vat-dyed, or top-dyed with brushing machines, and thus less work for the blender.

*Earnings*

Blenders are paid piece rates. However, they were guaranteed at least \$1.50 an hour in the union contracts in force during the early part of 1948. Although average hourly earnings greatly exceed \$1.50, frequent lay-offs have made annual earnings rather low in all but very good years.

## Fur Craftsmen (Manufacturing)

(D.O.T. 4-21.110 and .210; 6-21.110 and .210)

*Outlook Summary*

Job opportunities for only a few additional workers, to replace those who leave the trades because of death or retirement. In the long run, prospects are good for employment above the pre-war levels and for more stable employment conditions than have prevailed in the past.

*Nature of Work*

Cutters, sewing machine operators, nailers, and finishers are the four principal craftsmen in fur-garment manufacturing. About four out of every five workers in shops which turn out ready-made fur clothing are members of one of these crafts. As a team they do the job that was once done in its entirety by the traditional old-time furrier.

Most highly skilled of these specialized fur workers is the cutter. It is his job to see that the

best possible use is made of the expensive fur. First, he selects enough skins from stock to make up one garment, matching them for size, color, and texture. Then he trims each skin with his razor-edged furrier's knife, stretches it, and lays it out on the coat pattern. The finest furs are allotted to the most conspicuous parts of the coat such as the front, sleeves, and collar, and the poorer ones to places where they are less noticeable. When the lay-out is complete, the cutter shapes the fur pieces so that they may be assembled into a garment.

The sewing machine operator sews the skins together into sections of a coat, by means of a power-driven fur-joining machine that sews an overcast stitch. Later on he closes the coat—that is, joins the sections, attaches the collar, and assembles the sleeves into the body of the garment.

Fur sections go from the sewing machine operator to the nailer, who fits them to the pattern of



the coat. The nailer chalks an outline from a paper pattern on a board surface, dampens the skin side of the fur with a wet brush, and places the fur (with the skin side up) over the chalk outline. One edge of the coat section is nailed along the border and the fur is stretched, by hand or with pliers, to cover the outline. Remaining edges are nailed to the table, and the skins are allowed to dry in this stretched position. Once the coat sections are dry, they are squared—trimmed to the exact measurements of the pattern—by either the nailer or a squarer. Then they are sent back to the sewing machine operator for closing.



Student learning fur cutting in vocational school

Now the coat is ready for the finishers, who perform the tasks necessary to complete the garment, such as cutting, fitting, and sewing in linings, inserting shoulder pads, and attaching buttons. Some of the finishing work is done by sewing machine, some of it by hand.

#### *Where Employed*

Most of the jobs are located in New York City,

where over 80 percent of our fur clothing is made. A few specialized fur workers are found in retail fur shops, fur alteration and repair sections of department stores, specialty shops, and cleaning and storage establishments scattered throughout the country. In most retail establishments, however, all-round workmen known as furriers perform several or all of the operations involved in the manufacture, repair, and restyling of fur garments.

#### *Training and Qualifications*

The fur worker learns his craft on the job, but there is no organized or formal apprenticeship program. The length of the training period depends upon the learner's previous experience (he is often chosen from the unskilled workers in the shop) and upon his aptitude for the work. Cutters usually qualify for work on inexpensive furs in about 2 years. But before they can be trusted with very expensive skins, they must have several years of additional experience. The same thing holds true for other fur workers, except that the learning period is shorter. Finishers are often already skilled in needlework when they go into fur work, but must have additional training.

Many learners go to school in the evening. The Central High School of Needle Trades in New York City (a vocational school) has a department dealing specifically with fur work.

Entrance into the fur crafts is difficult. Since the fur industry is small and seasonal in nature, the union to which the workers belong, the International Fur and Leather Workers (CIO), tries to prevent overcrowding and resulting unemployment by limiting the number of new members entering the fur trades. For example, no new members are admitted if there is any unemployment in the industry.

#### *Outlook*

On the whole, the war and early postwar years have been very prosperous ones for the fur industry. Temporary set-backs have occurred, but throughout most of this period fur sales have been maintained at all-time high levels. If business conditions remain favorable and consumers' incomes high, employment in the fur industry should hold up pretty well in the next several years. No

increases in employment are expected over the current levels, however, and any job openings will be limited to the replacement of workers who die or retire. Since the industry is small, these vacancies will be few. There are probably not over 15,000 fur craftsmen—approximately 2,500 cutters, 5,000 sewing-machine operators, 2,500 nailers, and 5,000 finishers—plus about 3,000 less skilled floor workers.

The long-run indications are that employment of fur workers should remain above the prewar levels. There will probably be slumps, just as there have been in the past. But barring severe and prolonged depressions, these ups and downs—which seem to be chronic with the fur business—need not have any permanent effect on employment opportunities. By the same token, another depression would hit the fur industry hard. The fur trade is an extremely sensitive barometer of general business conditions. When times are bad, furs (along with other luxury goods) are one of the first things to be scratched from the shopping list.

In the long run, the fur industry will continue to benefit by the ever-increasing production of inexpensive fur garments—a trend that has been evident for the past 30 years. Improvements in dressing and dyeing techniques have brought forth

inexpensive furs (such as mouton-dyed lamb) which are both durable and attractive. Such furs are making customers out of women who never before have bought fur coats. But even more important, they mean steadier business—less trouble with ups and downs in the fur trade which always follow the rise and fall of prosperity throughout the country. As a result, although no increases in employment for fur workers are expected, they should have more regular employment—both from year to year, and from season to season—than they experienced in past years.

### *Earnings*

As of the early part of 1948, first-grade cutters were guaranteed a minimum of \$75 for a 35-hour week by union contract, first-grade operators \$64, and first-grade nailers \$59. Second-grade cutters (those working on cheaper skins) were guaranteed \$64, operators and nailers \$54. The minimum for finishers was \$53. Average weekly earnings are much higher; very few work for the minimum.

Because of the exceptionally large demand for furs, there has been comparatively little seasonal unemployment during the past several years. However, in ordinary times all but a few highly skilled fur workers have been unemployed for several months out of the year.

## Furriers (Retail Trade)

(D.O.T. 4-21.010)

### *Outlook Summary*

Opportunities good in next several years but openings widely scattered. Over the longer run retail furriers should find steady employment.

### *Nature of the Work*

In retail establishments, there are not many specialized craftsmen such as are found in the manufacturing plants which turn out ready-made fur garments for sale to stores. (See statement on fur craftsmen.) Furriers in the retail shops are all-around craftsmen capable of cutting furs, operating a sewing machine, nailing, and finishing. In the smaller shop, the furrier actually performs all of these various operations. In larger estab-

lishments, he may concentrate on the work requiring the most skill, such as cutting and designing (i. e., modifying existing designs or patterns). Apprentices, learners, and other partly trained workers may work under the supervision of the master furrier.

Of the furriers in retail trade, somewhere around half are employed in department stores and other retail outlets for ready-made fur garments which keep a staff of fur workers for alterations, repairs, and the remodeling of fur garments. The others are found in retail fur shops which make some fur garments to order. Many of them are the owners or managers of shops, which they usually run unassisted or with a small staff. A large number of fur shops are devoted almost exclusively

to fur-garment repair and to cleaning and storage services; others sell fur coats, both factory-made and custom-made.

Whether he works in a fur shop, department store, or elsewhere, the furrier in retail trade spends more of his time altering, repairing, and restyling old garments than he does in the manufacture of new fur garments. Formerly all fur coats were made to order by the custom furrier. But now most of the fur coats sold by the so-called custom furrier are ready-made garments, produced by New York manufacturers.

#### *Where the Jobs Are Located*

Fur workers in retail trade are scattered all over the country. But employment is concentrated in large cities, since it is there that the fur shops, department stores, and other retail outlets are mostly located. Because of climate, clothing habits, and more money for such luxuries, people who live in the Northeast and Midwest are the best fur garment customers. As a result, stores featuring fur garments are most numerous in this part of the country.

#### *How To Qualify as a Furrier*

One who wishes to qualify as a retail furrier must obtain several years of experience in an established shop. The learner usually begins with unskilled work, graduates to skilled operations, and shifts from one job to another until (usually after a period of 4 or 5 years) he has acquired the versatility of a master furrier.

The training period can be shortened if the learner has the opportunity to take related courses in evening school. Trade schools in the larger cities throughout the country offer needlecraft courses which are sometimes good as a background, but do not offer direct training for fur workers. The Central High School of Needle Trades in New York City is the only vocational school that has a department dealing specifically with fur work. This school has all the facilities of a fur workshop and an experienced staff of instructors. In addition, New York University offers courses on furs and fur merchandising which are especially valuable to apprentices or learners in the retail end of fur work.

There are a few nonunion retail fur shops, but

for the most part the trade is highly unionized. To prevent overcrowding and unemployment in this small trade the union to which the furriers belong, the International Fur and Leather Workers Union (CIO), limits the number of new members it takes in.

#### *Outlook*

Over the past 50 years, the bulk of fur-coat manufacturing shifted from the retail furrier to the manufacturer of ready-made garments, and the number of furriers in retail trade declined. There are probably not more than 15,000 furriers (all-round, skilled workers). It is not likely, however, that the trade will decline any further. There will always be a need for the services of the local furrier. Fur garments have to be repaired, altered, remodeled, and cleaned. Moreover, many women prefer custom-made fur coats.

Retail fur work offers more chances for immediate employment than any other branch of the fur industry. It is not that retail furriers expect to be any busier than they were during the war and thus need additional workers. Like the wholesale manufacturers, their business has been good since shortly before the war but is not likely to get any better. The reason is that outside of the New York City area there was a wartime scarcity of all-round furriers and skilled specialists. New people could not be trained overnight, so many fur shops and department stores had to hire seamstresses or tailors to do their fur work, under a furrier's supervision. Others simply stopped offering fur service, or sent remodeling and repair work to New York. Now that workers who might be trained are more plentiful, retailers want to correct temporary wartime measures. Consequently, there are reasonably good opportunities throughout the country, although the openings are widely scattered.

#### *Earnings*

Furriers employed by retail fur shops and department stores in New York City make at least \$75 a week but the majority earn considerably more. Earnings in smaller cities are somewhat lower. The income of the retail furrier who owns his shop depends upon such factors as his ability, both as a craftsman and as a businessman, his clientele, and local economic conditions.

Since the fur retailing business is seasonal in nature, annual earnings are not as large as the high weekly wages would indicate. However, because of the diversified nature of his work—which includes manufacturing, repairing, remodeling, etc.—the fur worker in retail trade is more steadily employed throughout the year than craftsmen

located in wholesale manufacturing houses. Moreover, in contrast to New York City, many sections of the country rarely ever have a surplus of skilled fur labor. Consequently, quite a few retail establishments retain their skilled fur workers on a yearly basis, giving them paid vacations and part-time work during the slack periods.

# *Railroad Occupations*

## *Importance of Railroads*

The railroad industry is one of the giants of American enterprise, with around 1½ million workers and a vast network of lines connecting all parts of the United States. Railroads carry more freight and passengers and employ more people than all other intercity transportation agencies combined. They have more workers than are employed in automobile plants or in factories making all kinds of clothing and other finished textile products; half again as many as are engaged in all types of mining.

In an industry as large as this, thousands of job openings arise each year as workers die, retire, or transfer to other fields of work. Openings occur in every State, in the great number of communities of all sizes which are served by the railroads. These jobs are so varied that people with very different interests and personalities can find satisfactory positions in railroading. Regardless of the occupation they enter, however, new workers must expect to start out at the bottom of the ladder and to work up slowly as they prove their ability and acquire seniority with the company.

## *The Railroad Industry*

The big, well-known railroads are all in the group known technically as class I line-haul railways. There are 135 companies in this group, each with over \$1,000,000 of revenue a year and lines connecting two or more cities or towns. In 1947, these roads employed, on the average, 1,350,000 workers, about 88 percent of all the employees in the railroad industry.

Besides the class I roads, there are about 350 smaller line-haul railways and over 200 switching and terminal companies. ("Switching" is moving cars about in the yards as needed when trains are being made up or broken up.) The small line-haul railroads have about 18,000 employees, the switching and terminal companies about 63,000—alto-

gether, only 5 percent of the workers in the industry. Other employers in the industry are the Railway Express Agency and the Pullman Company.

To outsiders, carrying passengers may seem to be the most important function of the railroads. The railroader knows, however, that freight business brings in far more revenue. In 1947, 81 percent of all class I railroad revenues were from freight and only 11 percent from passenger traffic. The remaining revenue came from mail, express, and various other sources.

Railway lines spread over the country like a giant web, connecting every State and city and thousands upon thousands of towns and villages. Chicago is the hub of the Nation's railroad network. Here, the great eastern and western systems meet, and connections are made also with routes to the north and south. New York City ranks second as a railroad center, but had only 29,000 railroad workers in 1940 compared with Chicago's 46,000. Other important railroad cities are, in the East, Philadelphia, Buffalo, Baltimore, Pittsburgh, and Jersey City; in the Midwest, St. Louis, Cleveland, Detroit, Minneapolis, and St. Paul; in the South, Louisville; and on the Pacific coast, Los Angeles. These 14 major centers, with their large stations, yards, and company main offices, had about 185,000 workers in 1940. This, however, was only one-sixth of the total number of railroad employees. Five States—Pennsylvania, Illinois, New York, Ohio, and California—had about two-fifths of all railroad employees in 1940.

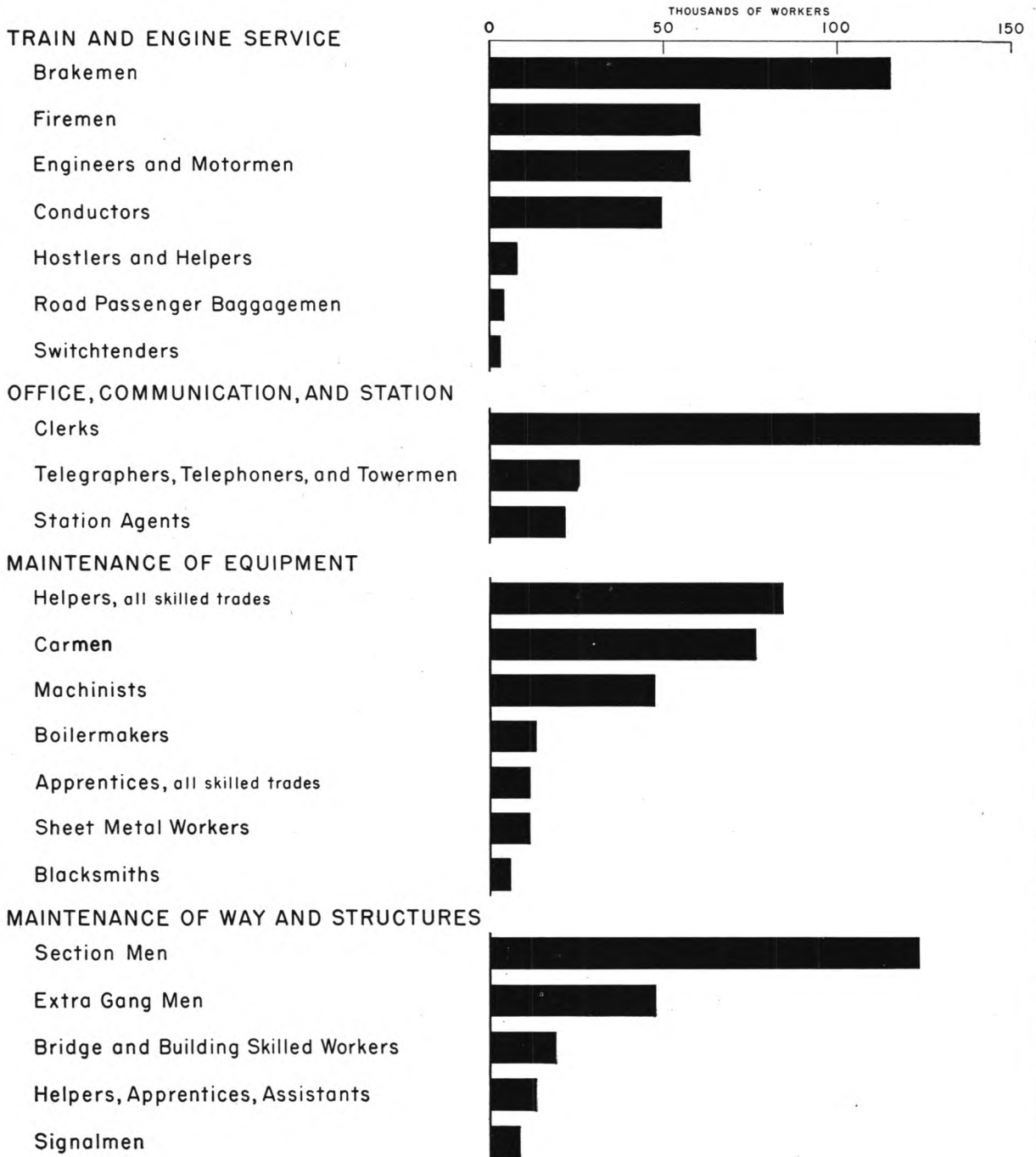
## *Railroad Occupations*

Locomotive engineers and truck laborers, car repairmen and telegraphers, station agents and clerks are but a few of the many different kinds of workers needed to run a big railroad. Chart 45 shows how many persons were employed in these and a number of other railroad occupations in

CHART 45

## BRAKEMEN, CLERKS, AND SECTION MEN ARE LARGEST GROUPS OF RAILROAD WORKERS

EMPLOYMENT IN SELECTED OCCUPATIONS ON CLASS I RAILROADS, 1947



1947. The occupations shown were selected from the much longer list of all railroad jobs because of their importance to people considering a career in railroading. They include the largest railroad occupations and several smaller ones in which the outlook is particularly favorable or which are of special interest for other reasons.

The train and engine service workers, shown at the top of the chart, are the men who operate trains on the road and make up and break up trains in the yards; a few do related work. Maintenance-of-equipment workers, another large group, are responsible mainly for keeping freight and passenger cars and locomotives in good running order. Employees in the maintenance-of-way and structures department have to keep the track and road-bed in good condition and repair bridges, stations, and other buildings. Other major occupational groups are office, communication, and station workers and service employees.

Practically all the workers in train and engine-service occupations and maintenance jobs are men (except for a few women taken on as "trainmen" during the war and some who work as cleaners). Even in clerical jobs men predominate, though in many other industries most of the clerical work is done by women.

Negroes are not often found in skilled jobs. There are a couple of thousand Negro brakemen and firemen in the South and some Negro helpers in the shop crafts, but very few have been promoted to higher-grade positions. On the other hand, most of the workers in service occupations such as cooks and waiters are Negroes.

Besides the occupations mentioned so far, railroads have a great variety of other jobs—ranging from top executive and professional positions to unskilled laundry and cleaning jobs. Sizable numbers of workers are employed as foremen, stenographers and secretaries, switchboard operators, watchmen, claim agents and investigators, truck drivers, power linemen, stationary firemen and engineers, and crossing and bridge flagmen. Many of these types of workers are of course found also in other industries; their duties on the railroads are very similar to those of comparable workers elsewhere.

### *Outlook*

The number of workers employed on railroads will probably tend to decrease over the long run. The downward trend in employment is likely to be very slow, however, provided that general economic conditions remain good. From time to time, short-run factors such as cuts in working hours may interrupt this trend and lead to employment increases.

The main reason for anticipating declining railroad employment is the prospect of further technological advances in the industry. The outlook for freight traffic, which provides the bulk of railroad business, is good; this type of traffic may even increase slightly over the long run. Passenger traffic will probably have a slow downward trend, except when there may be temporary offsetting factors such as expanded military travel. In any case, the number of workers needed to handle a given amount of traffic is likely to decline slowly but steadily, as in the past.

The increasing productivity of railroad labor has been the result of many improvements in railroad equipment and methods of operation, including the introduction of more powerful locomotives which can haul longer trains at higher speeds; development of cars, rails, and other equipment, which are more durable and need fewer repairs; introduction of machinery in maintenance-of-way work; improved communication and signaling systems; and mechanization of office work. Some new jobs have been created as a result of these innovations. But in every case the net effect has been to decrease the number of workers needed to handle a given amount of traffic. In 1947, railroads carried almost half again as many revenue ton-miles and passenger-miles as in 1929 with about four-fifths as many employees.

Technological developments will have a much greater effect on employment opportunities in some railroad occupations than others, as indicated in the statements on different railroad occupations in this handbook. For a few occupational groups (for example, signal workers and electricians) employment may even tend to increase. The outlook in different occupations will also be affected by other special factors. In the near future, for example, the larger-than-normal backlog of main-

tenance and improvement work needing to be done on railroad equipment, road bed, and structures will probably mean especially favorable employment opportunities for workers in the maintenance-of-equipment and maintenance-of-way departments.

Because the total number of workers employed by the railroads is so great, there will be many thousands of job openings each year owing to deaths, retirements, and transfers to other fields of work. If there should be a major business recession and therefore a sharp drop in railroad traffic and employment, the number of job opportunities for newcomers would of course be drastically reduced, since furloughed workers have first claim on any job openings arising in their seniority districts. Even in bad years, however, conditions in the industry are likely to vary considerably from one part of the country to another and there may be openings for newcomers in some occupations and areas where there do not happen to be furlough lists.

#### *Earnings and Working Conditions*

The wages paid for an hour's work differ widely from one railroad occupation to another, depending on the degree of skill and length of experience required, the amount of responsibility for safe and efficient railroad operation involved in the job, and many other factors.

Of the occupational groups covered in this handbook, the one with the lowest hourly wage rate is redcaps. The union rate for most men in this occupation was \$0.91 an hour in early 1948; however, this figure excludes tips. The highest-paid group for which hourly earnings information is available is supervisory and chief clerks in major departments; these men had average straight-time earnings of about \$1.85 an hour in December 1947.

Rates remained about the same at least until September 1948 in these and other occupations for which data on December 1947 earnings are given in the following occupational reports.

Most railroad workers are on an 8-hour day and

a 48-hour week. This is the usual work schedule for employees in the yards, in station and communication jobs, in the car and locomotive shops, and in maintenance-of-way work. For overtime above these limits, workers generally receive premium pay at one and one-half times their regular hourly rates.

The rules governing the length of the workday for train and engine crews in road freight and passenger service are complex. In general, when a specified number of miles have been traveled or hours of work have been completed—whichever happens first—a full day's pay is considered to have been earned. Any extra work beyond that point is paid for at regular hourly or mileage rates.

Since railroads function 24 hours a day, many employees (usually those with least seniority) must work at night. Rates of pay for night work are the same as for day work.

A substantial majority of railroad workers are covered by collective agreements. For the most part they are organized on a craft or occupational basis. Contracts between the unions and the railroad companies regulate wage rates, hours of work, seniority, and many other matters affecting railroad jobs. The principal unions representing the occupational groups covered in the handbook are listed in the separate statements.

#### *Where to Go for Jobs and Additional Information*

Job seekers may apply to the railroad officials listed in the individual statements on each occupation. These officials can be located by inquiring at local railroad stations. People interested in obtaining additional information on railroading may read:

Henry, R. S. *This Fascinating Railroad Business*. Indianapolis: Bobbs-Merrill Co., 1946.

Holbrook, S. H. *The Story of American Railroads*. New York: Crown Publishers, 1947.

Van Metre, T. W. *Trains, Tracks, and Travel*. New York: Simons-Boardman Publishing Corp., 1946.



## Locomotive Firemen and Helpers

(D.O.T. 5-42.100)

### *Outlook Summary*

Moderate numbers of openings for newcomers in near future. Slight downward trend in employment likely in long run.

### *Nature of Work*

Firemen work as members of engine crews in yard, freight, and passenger service. Keeping a lookout for signals and for obstructions on the track is an important part of a fireman's job; he, as well as the engineer, is held responsible for any accident due to failure to observe signals. On hand-fired locomotives, he must also properly distribute coal into the firebox, by shovel. However, all locomotives of this type (except small ones, used to a decreasing extent as switching engines) will soon be replaced by mechanically stoked, or Diesel or other oil-burning engines. On locomotives of the latter types, the firemen (sometimes known as "helpers") can control the supply of fuel by watching gages and adjusting valves. Helpers also assist in operating electric locomotives.

### *Qualifications, Training, and Where Employed*

Applicants are generally required to be not younger than 21 nor older than 27. They should usually have completed high school and must pass rigid physical examinations. Good eyesight and hearing are essential. Some men begin as laborers in engine houses or shops, where locomotives are repaired, and then go into fireman positions.

A new fireman must make trial trips for a brief period lasting only 10 days or even less on some roads, up to 3 weeks on others. After this, he almost always begins on the "extra board" (a pool of men who do not have regular assignments) in yard work, taking assignments in order as men are needed. He may remain on extra work for several months and then obtain a regular assignment in yard work. After some time he usually moves to a regular assignment in freight service and eventually to passenger service where hourly pay is highest. Some men, however, prefer to re-

main in yard service, where they have a chance to live a more regular home life than do men in road service (who often have to be away from their home terminals overnight).

While on the job, a fireman must be constantly absorbing the knowledge and obtaining the skills which will make him eligible for a locomotive engineer's job. At specified intervals, he is expected to take progressive examinations on engine machinery, air brakes, fuel economy, timetables, train orders, and other operating rules. If he fails to pass after several tries, he is sometimes dismissed.

A fireman may qualify as an engineer in 3 or 4 years, but as a rule he has to wait much longer than that for his first engineer assignment. Before the war it often took 10 to 15 years or even longer for a fireman to become an engineer.

### *Outlook*

There will probably be moderate numbers of job openings for newcomers in this occupation in the near future. The total number of firemen employed is not expected to increase; however, in this group of more than 60,000 employees, a few thousand men quit, are promoted, or leave for other reasons each year and must be replaced. Whenever there are men on furlough (owing to seasonal lay-offs and other factors), these workers have first claim on any openings that arise. Immediately after the war, many roads had to furlough firemen because of falling traffic and the need to make room for returning veterans, but most of these men have now been rehired, or have taken other jobs. There will therefore be room in the near future for a good many people without "firing" experience. The best prospects for employment as student firemen are for men already working for railroads in other jobs and those whose fathers or other relatives are railroaders.

Over the long run, employment of firemen will tend to decrease, although cuts in working hours may at times offset this trend. Increasing use of Diesels or other powerful new engines will cut

down employment of firemen, because the same amount of traffic can be hauled with fewer engine crews, especially in mountainous areas where steam "helper" engines and crews can be eliminated. Since new types of engines are introduced gradually, the resulting decrease in the number of firemen needed will come about slowly—very slowly indeed on many roads, somewhat faster on others. Provided general business activity remains at high levels, it is likely that lay-offs of firemen will be only temporary in most cases. A major decline in business activity, however, would lead to a marked drop in railroad traffic and therefore in the number of firemen needed.

### *Earnings and Working Conditions*

Firemen in yard service had average straight-time earnings of around \$1.33 to \$1.35 an hour in September 1948. Freight and passenger firemen generally have higher take-home pay than yard firemen.

In both yard and road service, the newer workers who are on extra boards tend to have less work and lower incomes than men with more seniority who have regular runs. The working hours of men on extra boards are very irregular. Often, they have to work at night and on Sundays and holidays.

Firemen are covered by union contracts on all major railroads. They are represented mainly by the Brotherhood of Locomotive Firemen and Enginemen.

### *Where to Apply for Jobs*

Men seeking jobs as student firemen may apply at the nearest road foremen's office. Those interested in laborer jobs that may help them to get preference for future openings as firemen may apply to roundhouse foremen or master mechanics.

See also *Locomotive Engineers*, page 332, and *Hostlers (Railroads)*, page 336.

## Locomotive Engineers

(D.O.T. 5-41.010)

### *Outlook Summary*

Engineer jobs filled only by promotion of qualified firemen, on a strict seniority basis. Promotions likely to be slow.

### *Nature of Work*

The main duties of a locomotive engineer are operating the controls of a steam, Diesel, or electric locomotive and keeping a constant lookout for signals and for obstructions on the track. He also directs, as necessary, the work of the fireman, checks the locomotive at the beginning and end of each run, and performs related tasks.

Most locomotive engineers—about 57,000 in 1947—are employed by class I railroads. A few work for small railroads and switching and terminal companies.

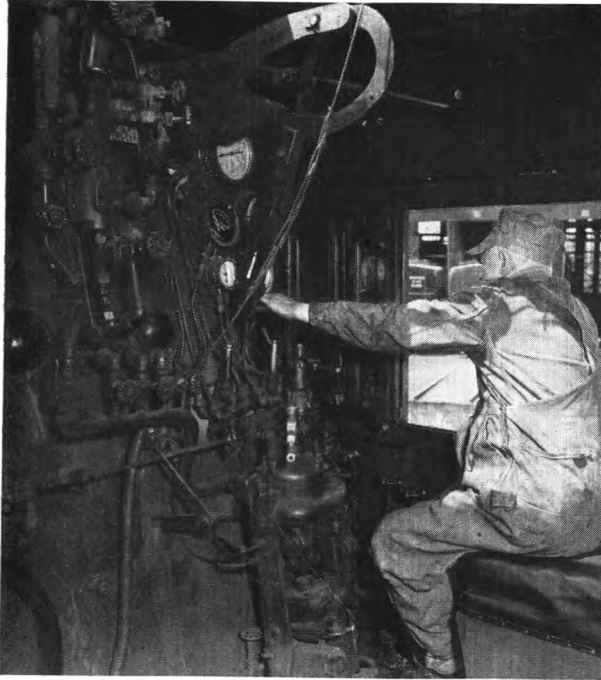
### *Line of Promotion*

When a fireman is promoted to engineer he usually begins on the yard extra board, later gets a yard switching assignment, and then moves on to

road freight or passenger service. Men with greatest seniority, who have their choice of available jobs, are frequently found on the new Diesel locomotives. Some oldtimers, however, prefer to remain on older steam engines where the work is more exciting. A very few engineers in road service may work up to supervisory positions such as road foreman.

### *Outlook*

Positions as engineers are generally filled by promotion of qualified firemen on a strict seniority basis. During the war, the great increase in traffic and the loss of some engineers to the armed forces led to much faster promotions than in the prewar period, when firemen usually had to wait many years for an engineer assignment. With the drop in traffic and the return of servicemen since VJ-day, promotions have slowed down. They will probably continue to be slow over the long run, since employment of engineers is expected to have a downward trend and openings will arise mainly as a result of deaths and retirements.



Engineer at controls of steam locomotive.

Men who accumulate enough seniority to become engineers have much job security as long as they are able to pass the physical examinations required at regular intervals. However, if there should be a major recession in general business activity leading to a sharp decline in railroad traffic, engineers on extra boards would be likely to have less work and lower earnings and some of the junior men might have to become firemen again.

#### *Earnings and Working Conditions*

Yard engineers had average straight-time hourly earnings of about \$1.54 in December 1947. Freight and passenger engineers generally have higher take-home pay than yard engineers.

On most roads the engineers are represented by the Brotherhood of Locomotive Engineers; on some by the Brotherhood of Locomotive Firemen and Enginemen.

*See also* Locomotive Firemen and Helpers, page 331.

## Brakemen (Railroads)

(D.O.T. 5-38.010)

### *Outlook Summary*

A good many openings for newcomers in near future. Employment will probably decline slightly over long run.

### *Nature of Work*

The occupation of brakemen is by far the largest one in the train and engine service group. In 1947, about 115,000 men were employed in this occupation on class I roads; a few thousand more worked for switching railways and other companies.

Brakemen are employed in freight, passenger, and yard service. Both freight and passenger trains generally carry rear brakemen (or "flagmen"), whose main duty is to protect the rear end of trains from being run into during stops or delays by signalling with flags, flares, and other devices. Freight trains usually carry at least one other brakeman, whose work includes transmitting signals from one end of the train to the other, making frequent inspections of the train, operating hand brakes, and coupling and uncoupling cars

and air hose. Passenger brakemen (often known as "trainmen") perform many of these same tasks, look after the needs of the passengers, collect tickets, and assist the conductor in other ways. Yard brakemen (frequently known as "switchmen" or "yard helpers") assist in making up and breaking up trains, riding on the cars as they are shunted about the yard.

### *Qualifications and Advancement*

Applicants are generally required to be not younger than 18 (21 on some railroads) nor older than 28 or 30. They should usually have completed high school and must pass rigid physical examinations. Student brakemen must make two or three trial trips without pay. After this brief trial period, they usually start out on the extra board (a pool of men who do not have regular assignments). From the extra board, they move to other assignments in the same way as firemen do.

To qualify as a conductor, a brakeman needs at least 2 or 3 years' experience and has to pass writ-

ten and oral examinations covering signals, timetables, brake systems, operating rules, and other subjects; those failing to qualify after several tries are generally dismissed. Promotions are made according to seniority rules, as openings occur, and a man may have to wait 10, 15, or possibly even 20 years to become a conductor.

Brakemen may also bid for baggagemen jobs, and, on most roads, may transfer from yard work to road freight service and eventually to passenger work—which is generally considered the most desirable, since it is cleaner and less strenuous and usually involves shorter working hours. Occasionally, men prefer to stay in yard service to avoid the many nights away from home which may be necessary on road freight and passenger runs. A few others wish to stay in freight service, where they do not have to “dress up” in uniform and cater to passengers.



Brakeman giving "highball" to engineer.

### Outlook

There will probably be a good many job openings for newcomers in this occupation in the near future. Though the total number of brakemen employed is not expected to increase, the occupation is so large that several thousand openings arise each year owing to quits, promotions, and other types of turn-over. The proportion of work-

ers leaving the occupation each year is reported to be somewhat higher than in the case of firemen. Where there are men on furlough because of seasonal or other factors, they have first claim on any openings that arise in their seniority districts. But as of early 1948, there were few furloughed brakemen awaiting reinstatement; most of those laid off during the first postwar year, because of the drop in rail traffic or the need to make room for returning servicemen, had been rehired or had taken other jobs. Most job openings in the near future will, therefore, be filled by men with no previous braking experience. Young men who come from railroad families or who already work for the railroads in other occupations will generally be given preference for jobs.

Employment of brakemen will probably decrease over the long-run, although reductions in hours worked may at times have a counteracting effect. Introduction of improved methods of handling yard traffic, including radio telephone communications between yardmasters and crews, will reduce the number of yard brakemen needed to handle a given amount of traffic. Longer trains with heavier loads, made possible by the use of improved locomotives and cars, will cut the number of road brakemen needed to handle a given amount of tonnage. Since these improvements will be introduced gradually, any decrease in employment of brakemen will come about slowly; however, the rate of decrease will vary considerably among different railroads. As long as general economic conditions remain good, it is likely that lay-offs of brakemen will be only temporary in most cases and that many new workers will be taken on in the occupation each year.

### *Earnings and Working Conditions*

Yard brakemen had straight-time average hourly earnings of about \$1.40 in December 1947. Freight and passenger brakemen generally have higher take-home pay than yard brakemen. Newer men who are on extra boards tend to have lower earnings than those with regular assignments.

Brakemen are highly unionized. Most are represented by the Brotherhood of Railroad Trainmen; some by the Order of Railway Conductors, the Switchmen's Union of North America, and other unions.

### *Where To Apply for Jobs*

Men seeking positions as student brakemen, may apply at the nearest division superintendent's or trainmaster's office. Those interested in laborer jobs that may help them to get preference for

future openings for brakemen may apply to round-house foremen or master mechanics.

*See also* Baggage-men (Railroads), page 336, Conductors (Railroads), page 335, and Switch Tenders (Railroads), page 337.

## Conductors (Railroads)

(D.O.T. 0-92.00 to .29)

### *Outlook Summary*

Positions as conductors generally filled by promotion of qualified brakemen or baggage-men on strict seniority basis. Promotions tend to be slow.

### *Nature of Work*

Conductors act as "captains" of trains. They are responsible for the safety of the train and its cargo or passengers, for carrying out all orders regarding the operation of the train, and for the work of all members of the crew. Before a train leaves the terminal, the conductor determines that it has been thoroughly inspected and that all members of the crew understand the train orders. Between stops the freight conductor prepares detailed reports on such items as times of arrival and departure and the numbers of the cars and their contents. On passenger trains the conductor keeps records of passenger traffic and collects tickets and fares. Yard conductors (also called "yard foremen") are in charge of switching crews which make up and break up trains.

In 1947 there were about 49,000 conductors working for class I railroads.

Like other members of train and engine crews, new conductors usually begin on the extra board (a pool of men who do not have regular assignments) and then move successively to regular assignments, to freight service, and finally to passenger service. It takes many years to reach the top of this ladder, however. Promotion to still higher supervisory or administrative jobs is possible for a few experienced and exceptionally able men.

### *Outlook*

Positions as conductors are generally filled by promotion of qualified brakemen (or, in a few cases,

baggage-men) on a strict seniority basis. Promotions to conductor positions, as to engineer jobs, were stepped up during the war, owing to the great increase in traffic and the loss of some conductors to the armed forces. Since the war, promotions have slowed down, with the drop in railroad traffic and the return of veterans to their former jobs. It will probably take many years, in most cases, for brakemen to be promoted to conductors. Employment in the occupation is expected to have a slow downward trend; so openings will arise mainly as a result of deaths and retirements.

Like engineers, conductors have much job security, provided they are able to pass the physical examinations required at regular intervals.

### *Earnings and Working Conditions*

As would be expected, conductors generally earn more than any other group of train- and engine-service workers except engineers. In December 1947, average straight-time hourly earnings were \$1.47 for yard conductors. Take-home pay for freight and passenger conductors is generally higher than for freight conductors.

There are collective-bargaining agreements covering conductors on every major railroad. Freight and passenger conductors are represented by the Order of Railway Conductors on the majority of class I roads; on most others by the Brotherhood of Railroad Trainmen. Yard conductors are represented by the BRT on most major roads; on some by the ORC or the Switchmen's Union of North America.

*See also* Brakemen (Railroads), page 333, and Train Baggage-men, page 336.

## Train Baggage-men

(D.O.T. 1-43.01)

### *Outlook Summary*

Openings in this small occupation almost always filled by transfers of qualified brakemen on a strict seniority basis. Employment stable.

### *Nature of Work*

Baggagemen are part of the train crew on passenger trains which have baggage cars. At railroad stations they receive trunks and other baggage checked by passengers, articles sent by Railway Express, and mail bags (unless there is a separate mail car). During the run they sort these items and see that each one is delivered at the proper station. Baggagemen keep records of all baggage, express packages, and mail bags received and put off. When a train has to stop on the road, the baggageman may be required to leave his car (which is always near the locomotive) and go forward along the track to protect the train by signaling.

### *How To Enter*

Positions as baggagemen are filled by transfers of qualified brakemen (or, occasionally, conductors) who choose to bid for these jobs, and assignments are made on a strict seniority basis. The work is considered relatively easy compared to that

done by brakemen. Frequently, the jobs are taken by older men or by those who do not want to assume the responsibilities of a conductor's position.

### *Outlook*

Employment in this small occupation remains about the same from month to month and year to year. In 1947 about 4,100 baggagemen were at work on class I roads, only about 200 more than before the war (in 1939) and slightly more than at the war's peak.

In the long run employment will probably remain very stable, assuming that general business conditions remain good. A few openings will arise owing to turn-over, but these will continue to be filled by workers in other train-service jobs.

### *Earnings and Working Conditions*

Baggagemen have a minimum guaranteed monthly rate of about \$295. Many of them, however, earn considerably more than this amount.

The Brotherhood of Railroad Trainmen represents the baggagemen on most roads, although on a few they have been organized by the Order of Railway Conductors or some other union.

See also Brakemen (Railroads), page 333, and Conductors (Railroads), page 335.

## Hostlers (Railroads)

(D.O.T. 5-41.020 and .030)

### *Outlook Summary*

Hostler jobs are filled only by men with railroad experience; occasional openings for newcomers as helpers. Employment likely to decline slowly over long run.

### *Duties*

Hostlers take railroad locomotives to the coal dock (or fuel-oil station) for refueling after they

have completed runs; supply them with water, lubricating oil and sand; service them in other ways, and deliver them to road engine crews. Inside hostlers handle locomotives only inside and around the engine house or on engine tracks at tie-up points. Outside hostlers have unrestricted territory within the limits of the railroad yard; they may have to take locomotives from the station to the engine house or vice versa and must be acquainted with signal systems used on the main

tracks. Hostler helpers assist outside hostlers in watching for signals and in other duties.

#### *How To Enter*

Some outside-hostler jobs are filled by men who began as helpers; some inside-hostler positions by men with experience as laborers in the engine house. More often, however, both types of jobs are filled by firemen who either prefer work near home to road service or have been disqualified for some reason—often a limited physical disability. There is little chance for advancement to higher positions; in fact, hostling is often called a fixture job.

#### *Outlook*

This is a small occupational group; in 1947, there were about 2,200 outside hostlers, 4,200 inside hostlers, and 1,500 outside hostler helpers working for class I railroads. Only a few openings as hos-

tlers will occur each year, as a result of turn-over, and these will be filled by men with railroad experience. There may, however, be occasional openings for outsiders as helpers.

Over the years there is likely to be a slight downward trend in employment, even assuming high traffic levels. Should there be a marked drop in traffic, employment would fall sharply in this as in most other railroad occupations.

#### *Earnings and Working Conditions*

In September 1948 the average straight-time hourly rate for outside hostlers was about \$1.39 for inside hostlers, \$1.31; and for outside hostler helpers, \$1.23.

On almost all roads hostlers are covered by the collective-bargaining agreements of the Brotherhood of Locomotive Firemen and Enginemen.

*See also:* Locomotive Firemen and Helpers, page 331.

## Switch Tenders (Railroads)

(D.O.T. 7-44.020)

#### *Outlook Summary*

Very small occupation offering few if any opportunities to men without railroad experience. Long-run downward trend in employment.

#### *Nature of Work*

Switch tenders are stationed at fixed points in railroad yards to throw certain track switches. The jobs are almost always filled by men already employed in the yard—often by disabled yard brakemen, since the occupation does not require as much stamina and agility as most yard work. Yard clerks sometimes take switch-tender jobs; from there, advancement to yard brakeman is possible.

The majority of switch tenders are employed by the class I line-haul railways; most of the remainder by switching and terminal companies.

#### *Outlook*

About 3,200 switch tenders were employed by class I railroads in 1947. Over the long run employment is expected to decrease, owing to replacement of hand-operated switches by automatic equipment. The few openings which occur through turn-over will be filled, as a rule, by men with railroad experience.

#### *Earnings and Working Conditions*

Switch tenders had average straight-time hourly earnings of \$1.23 in December 1947.

The Brotherhood of Railroad Trainmen represents switch tenders on most railroads. However, on some roads the agreements covering them have been negotiated by the Switchmen's Union of North America or some other organization.

*See also:* Brakemen (Railroads), p. 333.

## Telegraphers and Telephoners (Railroads)

(D.O.T. 1-41.22)

### *Outlook Summary*

Job prospects good in immediate future for both experienced telegraphers and newcomers. Long-run employment trend downward.

### *Nature of Work*

Telegraphers and telephoners are employed in most stations and many towers. They are responsible for receiving train orders from dispatchers and passing them on to train crews either in written form or by signals, as well as handling all the railroad's intercity communications that are not handled orally or by mail. Those in stations often have combination jobs involving ticket selling and other duties as well as handling of train orders and messages. Telegraphers and telephoners are employed also as "block operators," who control the manually operated block-signal systems which have been installed along many routes. Some of the telegraphers with the greatest speed in sending Morse code work in relay offices, which send relay messages regarding reservations, freight shipments, and other matters to other telegraph offices all over the railroad system. In addition, relay offices employ printer operators, who receive messages by teletype or other kinds of automatic telegraph printing machines.

In 1947 the class I roads employed about 15,000 telegraphers, telephoners, and towermen (including printer operators, block operators, and all towermen regardless of whether or not they were required to do telegraphing or telephoning). In addition, there were about 900 chief telegraphers and telephoners and wire chiefs and 10,000 workers who combined telegraphing or telephoning with clerical duties in stations. Finally, there were 14,000 station agents whose work involved handling of train orders and messages by telegraph or telephone.

### *Qualifications, Training, and Advancement*

For positions as student-telegraphers, the railroads desire young people not over 21 years of age,

preferably not more than 18 or even younger. Sometimes girls are hired, but young men are generally preferred. The physical examination for telegraphers pertains particularly to eyesight and hearing. A high-school education is required by almost all roads; legible handwriting is necessary.

Most student telegraphers receive 6 to 12 months of on-the-job training at a small station, under the supervision of the station agent or of an experienced telegrapher. They not only learn Morse code but are instructed in such subjects as train orders, operating rules, routes, rates, and accounts. Less often, beginners start by taking a course (which generally lasts 6 months) at a railroad telegraph school and then spend 2 or 3 months "cubbing" at a station. For men with previous telegraphic experience, the training period may be shorter. On many roads, trainees have to pass a written or oral examination on train and operating rules and a practical test on code speed and handling of train orders in order to qualify for a telegrapher job.

Newly qualified telegraphers usually begin as extra workers and then bid for regular assignments. The men with greatest seniority have first chance at the shifts they prefer and at the various kinds of jobs within their seniority district (which, for most telegraphers, is the railroad division). They may bid not only on straight operator and block-operator jobs but also on towermen, telegrapher-clerk, and telegrapher-station-agent positions. Later on, they may work up to such positions as station agent in a major station, dispatcher, or wire chief.

### *Employment Prospects*

Employment opportunities are expected to be good in this occupation in the immediate future—better than in most other railroad jobs. A critical shortage of telegraphers developed during the war, and since VJ-day, the railroads have continued to have difficulty in recruiting enough workers. There are openings for both students and experienced telegraphers and telephoners in most parts



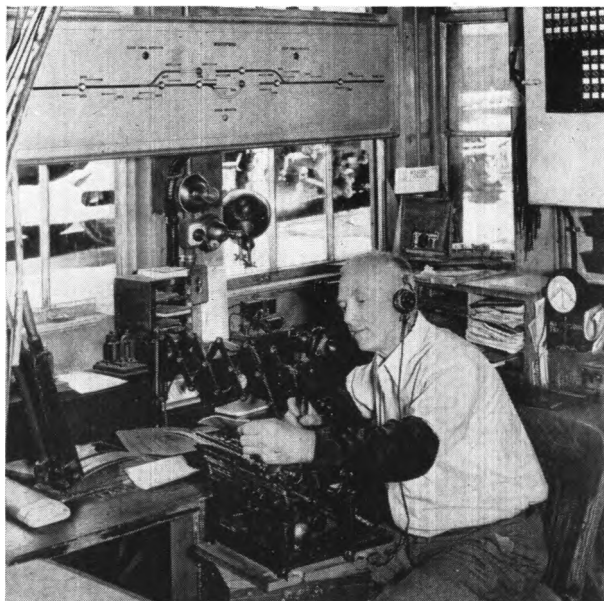
of the country, though the need is more severe on some roads than others.

Telegraphers or telephoners who are now on the pay roll or who take jobs in the near future should have a good chance of holding their jobs indefinitely, provided that railroad traffic remains fairly high. The downward trend of employment expected in the occupation over the long run will probably not be sharp enough to cause heavy, prolonged lay-offs, though some of the many hundreds of workers who die, retire, or leave for other reasons every year will not be replaced. Among the factors which have in the past reduced the number of Morse telegraphers needed and will continue to do so in the future are the use of telephone in place of telegraph in train dispatching and the introduction of teletype machines in relay offices. Workers in the telegrapher craft receive preference for telephones and teletype jobs, however, and these developments therefore tend to change the nature of the work done by some men rather than to eliminate many positions. As centralized traffic control systems are introduced, they do cut out some telegrapher and telephoner jobs, but these installations are likely to be spread out over a number of years. What the effects of radiotelephone will be upon railway communication jobs is not yet clear. Many railroad officials believe, however, that telegraphers or telephoners will always be needed regardless of radio.

The picture would of course be quite different if there should be a sharp decline in general business activity and therefore in railroad traffic. Under these circumstances, lay-offs would no doubt be necessary, as they were during the thirties, and there would be few opportunities for new workers—of whom at least a thousand or two are needed in good years, owing to turn-over.

#### *Earnings and Working Conditions*

Clerk-telegraphers and telephoners had average straight-time earnings of \$1.25 an hour in December 1947. Station-agent-telegraphers and telephoners had about the same average rate (\$1.26). For both groups, however, wages varied greatly from one station to another, since the pay scales are directly related to the type and amount of duties and responsibilities as well as the volume of dollar business done at the station. The wage



Telegraphers are responsible for receiving and dispatching train orders, handling all the railroad's intercity communication other than mail or conversation, operating block signal systems and many other jobs.

rates for students are far below those for qualified telegraphers.

Employees in jobs involving only telegrapher, telephoner, or towerman duties made about \$1.28 an hour in December 1947, on the average. Within this group also, there is wide variation in rates. Telegraph operators in relay offices have better-than-average pay; and there are many other differences.

The wage rates for chief telegraphers and telephoners and wire chiefs are naturally higher. In December 1947 these workers had average straight-time earnings of \$1.51 an hour.

Telegraphers and telephoners are represented by the Order of Railroad Telegraphers on nearly all major roads.

#### *Where To Apply for Jobs:*

Job seekers may apply at the office of the superintendent of telegraph or the chief dispatcher in cities where there are such officials. In smaller towns, station agents can provide information on how to apply for jobs.

*See also:* Station Agents (Railroads), page 341, and Towermen (Railroads), page 340.

## Towermen (Railroads)

(D.O.T. 5-44.020)

### *Outlook Summary*

Job prospects good in near future. Over the long run, employment expected to decline slowly.

### *Nature of Work*

Towermen, as the job title implies, work in railroad towers, which overlook yards, approaches to major terminals, and other places where two or more tracks come together or cross each other or where special care must be taken to prevent accidents. The towermen operate switches, and, sometimes, signals; they may also transmit train orders and inform the dispatcher of the exact times at which trains pass their tower.

In some towers, switches are operated by pulling long levers which move rods leading to the switches. In larger and more modern towers, signals and switches are operated electrically, and they are almost universally interlocked, thereby making it next to physically impossible for towermen to make mistakes that might lead to collisions.

Workers who operate the levers controlling switches in either mechanical or electrical towers are generally known as levermen. If they do telegraphing in addition to operating levers, they are generally called levermen telegraphers, or towermen telegraphers. In large towers, where several men are employed, a tower director is in charge; and where he directs movements through several towers or very intricate yards, as in large cities, he is designated a train director.

### *Qualifications and Lines of Promotion*

Towermen begin either as telegraph operators or in leverman jobs which do not require knowledge of telegraphy. At towers with the most simple mechanisms, it may take only a week or so for the leverman to learn his work.

Towermen with telegraphic skills may bid for any of the positions on the telegraphers' roster for their seniority district. Advancement to tower director, train director, and dispatcher is possible.

### *Outlook*

In the near future, there will probably be a good many openings for newcomers in leverman jobs. Opportunities for railroad telegraphers to transfer to towermen-telegrapher positions are expected to be unusually numerous also. A severe shortage of towermen, as of telegraphers, developed during the war, and the need for workers has been met only in part since VJ-day.

Over the long run, the number of towermen employed is likely to decrease owing primarily to further installations of centralized traffic-control equipment. Where these systems are installed, the train dispatcher himself frequently is assigned to operate the signals and switches, thereby replacing towermen. These systems are being installed quite steadily where traffic is dense and will cover more miles of track, as the machines are perfected. Given continued high levels of general business activity, there is no reason to anticipate many prolonged lay-offs of towermen, though it is likely that some of the vacancies created every year by turnover will not be filled.

### *Earnings and Working Conditions*

Separate figures on earnings are not available for towermen. Statistics on the average hourly and yearly pay of the telegrapher, telephoner, and towerman group and on the working hours of this group are given on page 339, however. In general, levermen have lower wage rates than other towermen.

The Order of Railroad Telegraphers represents the towermen, levermen, tower and train directors on nearly all major railroads.

### *Where To Apply for Jobs*

Men seeking positions as levermen may apply to signal supervisors, division superintendents, or chief dispatchers, who can be located by inquiring at any railroad station. Station agents can also

provide information on where to apply for jobs in communities where there are no such officials.

*See also* Telegraphers and Telephoners (Railroads), page 338.

## Station Agents (Railroads)

(D.O.T. 1-44.22)

### *Outlook Summary*

Positions filled by railroad telegraphers or telegrapher-clerks. Employment much more stable than in most other railroad occupations but may decline slightly over long run.

### *Nature of Work*

A station agent is the railroad's official representative in all dealings with the public at his station. At small one-man stations, the agent has to do all the work himself—selling tickets, checking baggage, calculating freight and express charges, loading and unloading freight and express packages, even taking care of the station and grounds. At most stations, the agent also serves as telegrapher and telephoner, with responsibility for receiving and delivering train orders and messages pertaining to the company's business. In general, the larger the station, the more work that is delegated to clerks, cleaners, and other employees working under the agent's supervision. Men who have worked up to agent positions in major freight or passenger stations have mainly administrative and supervisory duties and perform little of the detailed work themselves.

Altogether, about 21,000 station agents were employed in 1947. Two-thirds of these men (14,000) were agent-telegraphers or telephoners; the next largest group (5,000) had nontelegraph jobs at the smaller stations, while 2,000 had supervisory positions at major stations.

### *Qualifications and Lines of Promotion*

Positions as agents in the majority of stations are filled, as a rule, by promoting experienced telegraphers, though sometimes clerks get the jobs. Positions as assistant agents at large stations are also filled in most cases by promoting telegraphers. For jobs in very small nontelegraph stations, telegraphic experience is not required.

Agents may move up the ladder by going from smaller to larger stations. Another frequent line

of promotion is from assistant agent, to agent, and possibly station supervisor or inspector and trainmaster.

### *Outlook*

Employment is likely to be more stable in this occupation than in most other railroad jobs, though it may decline slightly over the long run. There will be a limited number of openings in station agent jobs each year owing to turn-over, but these will continue to be filled, in the main, by telegraphers or clerks already on the pay roll.

Since the early twenties the number of agents employed has declined slowly but steadily, as more and more stations were closed. It was possible to eliminate these stations because automobiles enabled people to travel further to reach railroad stations than they could in the horse and buggy days.

The number of stations and agents may continue to decline, but probably at a much slower rate than in the past two decades. Most of the stations which could be easily eliminated have already been closed. Even if there should be a substantial decline in business activity and railroad traffic, the number of stations and agents would remain about the same for a while, though some individual agents might be bumped by telegraphers with greater seniority who were displaced from other types of jobs. Should there be a prolonged depression, however, it is likely that some stations would be closed.

### *Earnings and Working Conditions*

Supervisory station agents are generally paid on a monthly basis. Most agents, however, are paid on an hourly basis, and if they handle the business of the Railway Express Agency, they receive, in addition, a commission averaging 10 percent on the business transacted. Pay varies with the location and size of the station and the volume of business. Average straight time hourly earn-

ings in December 1947 were \$1.77 for supervisory agents at major stations, \$1.32 for nontelegrapher agents, and \$1.26 for agent-telegraphers and telephoners.

Most station agents are represented by the Order of Railroad Telegraphers.

See also Clerks (Railroads), page 342, and Telegraphers and Telephoners (Railroads), page 338.

## Clerks (Railroads)

(D.O.T. 1-11.)

### *Outlook Summary*

Many openings in near future. Long-run employment trend likely to be slowly downward.

### *Nature of Work*

About 141,000 clerks worked for class I railroads in 1947.<sup>15</sup> The largest group (115,000) were employed as ticket sellers, rate clerks (who determine the charges for freight shipments), timekeepers, bill clerks, yard clerks, baggage-room clerks, and in related jobs. In small offices or stations, one man may handle several different types of work; in large offices with many clerks each one may be highly specialized.

A smaller group of clerks (about 12,000 in 1947) had higher-grade jobs involving more responsible or technical work. Some prepare the statistics on employment, traffic, equipment, and other subjects required by the Interstate Commerce Commission. Among the other types of workers in the group are cashiers, who deal with the public on such matters as uncollected freight bills and undercharges made by the road.

Supervisory and chief clerks numbered about 14,000 in 1947. They not only supervise other workers and assume responsibility for major or minor departments but may be called on to solve highly complex problems.

### *Qualifications and Advancement*

Beginning clerical jobs are filled either by hiring newcomers or by promoting office boys, messengers, or, in some instances, laborers already employed by the company. Positions of higher grade are almost always filled by promotions from within. Men are preferred for most jobs. A high-school education is required by some roads, and

clerical aptitude tests are given by a few. Training or experience in working with figures is helpful.

The line of promotion depends on the department in which the clerk is working. In many offices, he may hope to advance to assistant chief clerk, chief clerk, and, conceivably, still higher administrative positions. Some clerks have a chance to move from routine beginning jobs to work demanding special knowledge of accounting or statistics, which may lead eventually to positions such as that of auditor. Clerks in traffic departments may become traffic agents; those in supply and stores departments may advance to jobs such as buyer or storekeeper; those in stations have a chance to become ticket and station agents.

### *Outlook*

Many job openings are expected in the near future. The total number of clerks employed will probably not change very much in the next year or two, but the occupation is so large that thousands of vacancies arise annually through quits, deaths, retirements, and turn-over of other types. The turn-over rate is higher now than before the war; it is reported to be particularly high in some northern and western industrial cities. Furthermore, reduction of the workweek to 40 hours (from the present 44- or 48-hour standard) is now under consideration. If a 40-hour week is generally adopted, additional clerks will probably have to be hired in many places. Since there are now very few clerks on furlough, most of the openings in the near future will go to persons with other types of railroad experience or to newcomers.

Employment in the occupation will probably tend to decline over the long run. Further mechanization and more efficient office procedures will make it possible for fewer and fewer clerks to handle a given amount of work. Since new ma-

<sup>15</sup> Secretaries, stenographers, typists, and similar occupations are not included.

chines are introduced gradually and much clerical work does not lend itself to mechanization, the total number of clerks needed will probably decrease slowly, however. Workers in the occupation should have reasonable expectations of steady employment, provided general business activity remains at a high level.

If there should be a major recession and a consequent sharp drop in traffic, lay-offs would no doubt be heavy among some groups of clerks, including ticket sellers, rate clerks, and others who are directly concerned with passenger or freight traffic. In the audit and accounting departments and certain other branches of the railroads, the amount of clerical work to be done and the number of clerks needed are much less affected by changes in the volume of traffic.

#### *Earnings and Working Conditions*

For clerks in lower-grade jobs, average straight-

time hourly earnings were about \$1.23 in December 1947. Senior clerks and clerical specialists had considerably higher earnings (about \$1.46 an hour). Supervisory and chief clerks averaged about \$1.54 an hour in minor departments and \$1.85 in major departments.

The Brotherhood of Railway and Steamship Clerks, Freight Handlers, Express and Station Employees represents the clerks on all major roads.

#### *Where To Apply for Jobs*

Job seekers may apply at central employment offices maintained by railroads. In smaller communities where there are no such offices, they may apply to local officials, such as station agents, who hire clerks.

See also Station Agents (Railroads), page 341, Telegraphers and Telephoners (Railroad), page 338.

## Redcaps

(D.O.T. 2-92.30)

#### *Outlook Summary*

Few openings for newcomers in near future. Long-run employment trend slowly downward.

#### *Nature of Work*

The redcaps' primary job is to carry baggage for railroad passengers, either by hand or with trucks. They also check baggage, buy tickets, make telephone calls, and perform other services for travelers. In addition, they must be prepared to answer questions on such subjects as train schedules and the tracks on which particular trains will arrive or depart. At a few stations, they call out the names of trains, stock the time-table racks, and do cleaning and other work.

This is a small occupation. In 1941, the last year for which information is available, there were only about 4,300 redcaps.

#### *Qualifications and Lines of Promotion*

Hiring standards for redcap jobs vary from company to company. As a rule, applicants are

required to be at least 18 and not over 45 years of age. They must be able to read and write and pass physical examinations. Redcaps must be strong enough to carry heavy baggage. Most of them are Negroes.

There are few promotional opportunities for redcaps, although a small number may advance to the positions of assistant captain and captain in their stations.

#### *Outlook*

In the near future there will be few openings for newcomers. Since the war, need for porter service has dropped with the decline in railroad passenger traffic. At some stations redcaps have been furloughed. These laid-off workers have the first chance at vacancies created by turn-over; so wherever there are furlough lists, newcomers, for the time being, have no chance of getting jobs.

Over the long run, employment of redcaps is likely to decline slowly. The number of jobs is of course closely related to the amount of passen-

ger traffic, particularly Pullman travel. And it is the railroads' Pullman business which is likely to suffer most heavily from airline competition. A limited number of openings will arise each year owing to turn-over, which is reported to be low in this occupation. Should there be a sharp decline in business activity, bringing with it a sudden slump in passenger traffic, there would probably be many lay-offs and newcomers would find it extremely difficult to enter the occupation.

#### *Earnings and Working Conditions*

At present (early 1948) most redcaps are paid 91 cents per hour. They also keep any tips which passengers give them over the regular charge for baggage; the standard fees (now 15 cents per bag in many stations, 10 cents at others) are collected by the redcaps and turned in to their employers. It is reported that the 15 cents per bag charge has caused earnings from tips to drop. The amount received in tips varies greatly, depending on the city, the station, the individual worker and many other factors. In general, positions at automo-

bile or taxi entrances to stations are more profitable than those at trolley-car or foot-passenger entrances. Many companies assign the preferred positions to men with greatest seniority.

Redcaps work an 8-hour day, and a 6-day week. They are usually paid the regular rate for time worked over 8 hours per day or over 48 hours per week, but at some stations get one and one-half times the regular rate. Those who have worked at least 160 days during the previous year receive vacations with pay—6 days per year if they have had less than 5 years' service, 12 days if they have been with the company for 5 years or more.

These workers are covered by union contracts at most large stations. They are represented by the United Transport Service Employees of America (CIO), and the Brotherhood of Railway and Steamship Clerks, Freight-Handlers, Express and Station Employees (AFL).

#### *Where To Apply for Jobs*

Men seeking jobs in the occupation may apply at the stationmaster's office at any railroad passenger station having redcap service.

## **Carmen (Railroads)**

(D.O.T. 5-79.020)

#### *Outlook Summary*

A good many openings for newcomers as apprentices and helpers in near future; good prospects for skilled carmen. Long-run employment trend slowly downward.

#### *Nature of Work*

Railroad carmen, who numbered about 77,000 on class I roads in 1947, inspect and repair most of the 2,000,000 freight cars and 50,000 passenger cars. They also do most of the work involved in building any new cars made in the railroad shops, build and repair some parts of locomotives (for example, cabs and running boards), and frames and trucks of locomotive tenders, and are responsible for work on various kinds of small vehicles (including the motor cars used in transporting workers along the tracks). Besides all this, these

versatile craftsmen do all the carpentry and other woodworking needed in the shops and yards.

Because of the wide variety of jobs they may be called upon to handle, most carmen are skilled in both carpentry and metal working and can use many power machines as well as hand tools. However, the carmen group also includes some upholsterers, car painters, and patternmakers, skilled only in their particular specialties.

Even the all-round carmen are usually assigned to some one branch of the work. The largest number handle repairs and other work on freight cars. A sizable group do passenger car (or "coach") work. Others, known as inspectors, examine cars in the yards and stations, looking especially for any worn or damaged parts that might cause train accidents or delays. There is also a small group, called locomotive carpenters or tender repairmen, who are assigned to work in the engine houses and locomotive shops.

*Qualifications, Training, and Advancement*

The usual way of entering the carman craft is to work either 4 years as an apprentice or 2 years as a helper and then 3 years more as a helper-apprentice. Workers with related experience in other industries, especially car manufacturing, may be able to qualify as journeymen in less than 4 years.

To become a regular apprentice, one must be at least 16 and not over 21; to become a helper-apprentice, not older than 30 or 35 (younger men are desired). Good physical condition is insisted on. A few roads require candidates for regular apprentice positions to pass mathematical and mechanical-aptitude tests. Many union agreements provide that a high proportion of apprenticeships shall be given to sons of railroad employees, providing they meet hiring standards.

The great majority of apprentices receive all-round training in freight- and passenger-car work, both wood and steel, and in other branches of the

trade. Different training programs are provided, however, for the smaller numbers who are to become patternmakers, car painters, or upholsterers.

Young men who have completed their apprenticeships are, if possible, placed immediately in journeymen positions, but they are not retained on the pay roll if there are no openings for skilled workers. Journeymen with the greatest amount of seniority have their choice of the jobs they consider to be most desirable in terms of their interests or because the work is cleaner, easier, or more highly paid. A very few experienced carmen may be promoted to such jobs as lead supervisor and foreman and, possibly, shop superintendent.

On some roads, a few young men 18 to 25 years of age who have completed a technical high-school course are taken on as special apprentices. After 3 years of varied training, covering not only carmen's work but also the work of the other crafts in the maintenance-of-equipment department, they may choose the craft in which they wish to

Carmen are versatile mechanics who do most of the repair work on all types of railroad cars.



be employed. Later on, they are given special consideration for supervisory positions.

### *Outlook*

There is a shortage of skilled carmen in many communities. During the war thousands of men left to go into better-paying jobs in other industries and into the armed forces. Those who transferred to other civilian jobs generally lost their seniority rights, and many have not returned. Moreover, the railroads are engaged in a greatly expanded, long-range car-building program, in addition to their regular car-maintenance work; so thousands more carmen are employed now than before the war.

There will be several thousand openings for newcomers as helpers to carmen in the near future. A good many newcomers will also be taken on as apprentices. In some areas, where wage rates in manufacturing industries and construction are high in comparison to rates paid railroad shop workers, roads are reported to be having difficulty recruiting helpers and apprentices.

After the present backlog of maintenance and building needs has been reduced, employment will probably taper off slowly in this occupation as in most other railroad jobs. In general, the only job openings will be the few thousand arising each year as a result of turn-over. Should there be a serious decline in general business activity, lay-offs

would no doubt be heavy among carmen; in the past, when railroad traffic and income have declined, maintenance work has been deferred as much as possible and cuts in employment have tended to be more drastic in maintenance departments than in other major departments of the railroads.

### *Earnings and Working Conditions*

In December 1947, average straight-time earnings of freight carmen were about \$1.34 per hour; those of passenger carmen and tender repairmen, \$1.42. Time and one-half is paid for work above 8 hours per day and on Sundays and certain holidays. Six or 12 days' paid vacations a year is given, depending upon length of service.

Most carmen work outside on uncovered tracks and are on the job in all kinds of weather. On some roads, the men themselves decide when the weather is too bad for them to work; they do not receive pay for time lost on this account.

Carmen are represented on most roads by the Brotherhood of Railroad Carmen of America (AFL); on two, by the Brotherhood of Railroad Shop Crafts of America (independent).

### *Where To Apply for Jobs*

Those seeking jobs as apprentices and helpers may apply to shop or roundhouse foremen or master mechanics.

## **Bridge and Building Mechanics (Railroads)**

(See D.O.T. 5-25.840)

### *Outlook Summary*

A good many openings as helpers and apprentices and good prospects for skilled men in near future. Employment expected to remain at high levels for several years at least and decline slowly over long run.

### *Nature of Work*

The bridge and building men are, like the carmen, an unusually versatile group of workers. One day, they may be called on to repair a bridge; the next, they may work on a tunnel; the one after that, they may repair or build a station, water

tank, coal dock, ferry pier, or any one of a variety of other structures.

The largest group of "B. and B." workers are the carpenters or mechanics. These men are all-round mechanics, able to do not only carpentry, but also other types of construction work. About 14,000 of them were employed on class I roads in 1947. In addition, the bridge and building force included some 2,000 painters; about the same number of masons, bricklayers, plasterers, and plumbers; and half as many structural-steel and iron workers. Helpers and apprentices numbered about 7,500 altogether; foremen, around 4,000.



*Qualifications and Advancement*

New workers start out as helpers (or apprentices). Generally, they serve about 3 years as helpers before they can qualify as mechanics. As openings occur in skilled jobs, these are filled by promoting the qualified helpers with greatest seniority. Journeymen with years of experience and exceptional ability may work up to positions as inspectors, foremen, bridge and building supervisors, and even division engineers. The last mentioned position frequently requires special training.

*Outlook*

The employment outlook is good for skilled bridge and building men in the near future, and there are likely to be more openings than usual in helper jobs. The shortage of workers, especially journeymen, which developed during the war still continues. Since there is a particular need for foremen, men with better-than-average abilities who show promise as prospective supervisors are desired.

Employment will probably remain high in this occupation for several years at least, in view of the backlog of urgently needed repair and improvement work which has carried over from the war period. After this greater-than-normal backlog has been reduced, employment will tend to decline slowly. A long-run downward trend is expected for such reasons as the increasing substitution of

concrete and durable, treated lumber for untreated wood (which requires much more frequent repairs) and the greater use of power saws, drills, and other labor-saving equipment. However, turn-over is likely to create a few thousand openings for newcomers each year, so long as the country avoids a depression and its inevitable consequences—falling railroad traffic, heavy lay-offs of maintenance workers, and waiting lists for jobs.

*Earnings and Working Conditions*

Bridge and building carpenters had average straight-time earnings of about \$1.22 an hour in December 1947. Hourly earnings were slightly higher (\$1.24) for painters and still higher for ironworkers (\$1.35) and for masons, bricklayers, plasterers, and plumbers (\$1.34). But even these last two groups made less than most groups of skilled shop workers. Helpers of course have considerably lower rates. In December 1947 their average hourly pay was about \$1.09.

Bridge and building men often have to be away from home for days at a time. They generally live in camp cars but have to provide their own bedding and pay for their food.

The Brotherhood of Maintenance-of-Way Employees represents the bridge and building workers on most major roads.

*Where To Apply for Jobs*

Job seekers may apply to bridge and building foremen or division master carpenters.

## Signalmen and Signal Maintainers (Railroads)

(D.O.T. 5-79.170)

*Outlook Summary*

Good prospects for skilled men and moderate number of openings for newcomers. Upward trend in employment expected in both short and long run.

*Nature of Work*

Railroad signalmen construct and install signals and signal apparatus. These construction gangs travel from place to place and often live in camp cars. Signal maintainers do inspection and re-

pair work within a given territory, riding back and forth in private automobiles, company auto trucks, or on the tracks in small motor cars. The two types of jobs involve much the same mechanical and electrical skills.

*Training and Advancement*

In either signalman or signal-maintainer work, new employees start as helpers, doing semiskilled labor. After about 6 months to 1 year of training on-the-job (or longer, depending upon how often

vacancies occur), most helpers advance to assistants. Four years' experience as assistant generally qualifies a man for a journeyman job. As openings in skilled jobs occur, they are filled by promoting qualified assistants, according to seniority rules. On nearly all roads, journeymen may transfer from signalman to maintainer jobs or vice versa.

Both signalmen and signal maintainers may be promoted to more skilled and responsible jobs, such as inspectors and test-men, leading signalmen or signal maintainers, foremen, assistant signal supervisors, supervisors, and engineering positions.

### *Outlook*

Employment is expected to increase in both the short and long run. In 1940, about 10,300 signal workers (signalmen, signal maintainers, and helpers) were employed. Several thousand men left for the armed forces; nevertheless, employment

The signal maintainer plays a key part in the safe operation of railroads



rose to 13,000 by 1945. Since the end of the war, employment has continued to increase (to around 14,000 in 1947). It is likely that employment of both skilled and semiskilled workers will rise still further during the next few years, owing to the backlog of work and expected modernization of signal systems. Workers will also be needed to replace those who leave the occupation because of death, retirement, or for other reasons.

Signal workers probably will have an especially high degree of job security. This occupational group is among the few in railroading which is expected to increase in number over the long run. Moreover, in the group as a whole employment is less affected by the changes in the general level of business activity than employment in most other railroad occupations. While the amount of new construction and installation work falls off when railroad business declines, most maintenance work must be continued. On many roads, signalmen who may be laid off will displace maintainers in their district who have less seniority.

### *Earnings and Working Conditions*

Average straight-time hourly earnings in December 1947 were \$1.40 for signalmen and signal-maintainers; for assistants, \$1.23; for helpers, \$1.15. Time and one-half is paid for work above 8 hours a day and on Sunday and certain holidays. Maintainer work is fairly steady throughout the year. However, signalmen are likely to have less work in the winter than in other seasons, except in regions with mild winters. Six or twelve days' paid vacation a year is given, depending upon length of service.

These workers are represented on substantially all roads by the Brotherhood of Railroad Signalmen of America (AFL).

### *Where To Apply for Jobs*

Men seeking beginning jobs in signal work may apply to signal foremen, signal supervisors, or signal engineers of any carrier.

# Other Trades and Industrial Occupations

## Electroplaters

(D.O.T. 4-74.010)

### *Outlook Summary*

Few job openings for trainee electroplaters in next several years. No marked changes in employment over longer run, with most job openings for replacements of workers who die or retire.

### *Nature of the Work*

Platers work in electroplating shops, in which objects, usually of metal, are given a thin coating of a metal such as nickel, silver, gold, chrome, or tin. These coatings are applied mainly for ornamentation, but often are for protection against corrosion. Typical electroplated products include automobile bumpers and hardware, cigarette lighters, plated silverware, costume jewelry, plumbing fixtures, and electrical appliances. The plating is done by immersing the article in a liquid solution containing the plating metal and through which an electric current is passed.

The plater must first make sure that the articles to be plated have been properly cleaned and otherwise prepared for plating. He must know the characteristics of the metal being plated, the type and thickness of metal coating to be applied, and the area of the surface to be plated, so that he can judge the proper type and strength of solution to use, the electric-current strength, and how long the articles should be kept in the plating tank. In some electroplating shops, particularly the smaller ones, solutions are prepared in an outside testing laboratory, and standard procedures set up, so that the plater has only to maintain solutions, regulate the flow of electric current and the time the article is kept in the plating tank and watch to see that no trouble develops.

Platers usually supervise a number of semi-skilled and unskilled workers who perform such tasks as placing articles to be plated on the racks in which they are held while in the plating tank, and removing them from the racks after plating is completed. Except in the smallest shops, skilled platers may also direct the work of one or more "tank operators" who carry on the plating process at the tanks to which they are assigned. These workers have less knowledge and experience than the fully qualified platers. Their job is to carefully watch and regulate the plating operation but they usually have no responsibility in determining the solution used, the strength of the electric current, and the length of time the articles will be immersed.

### *Where Employed*

Platers are employed in many of the industries which have their products plated. The automobile and automotive parts industries are the largest employers of platers, and many platers are also found in plants making electrical appliances, refrigerators, radios, lighting fixtures, silverware, hardware, and costume jewelry. Many companies do not do their own plating, however, but send their parts out to specialized job shops to be plated. These shops are usually small, most of them having only between 5 and 50 workers, but since there are a great many such shops they employ over 20 percent of all the platers. Because they do work for different customers they must be prepared to handle many types of plating jobs. Many of the small job shops are owned by platers, who do the work themselves.

### *Training and Qualifications*

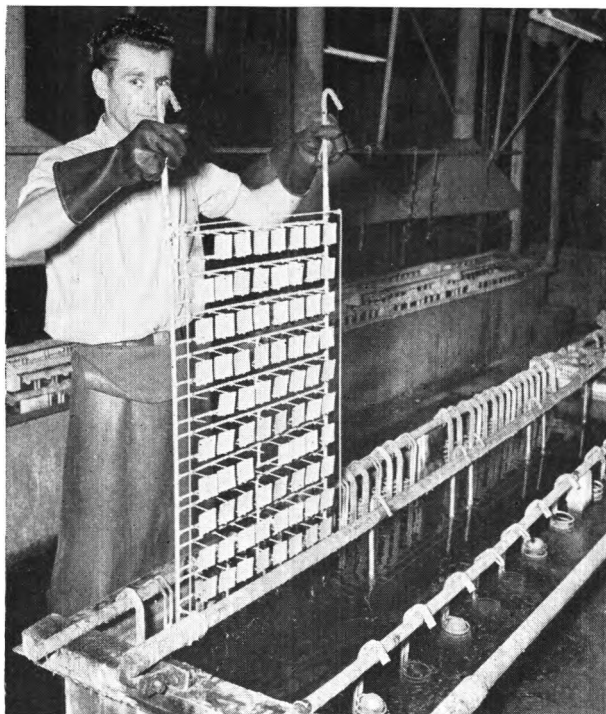
Plating is learned on the job. The training may be through an apprenticeship, ordinarily of 3 years, including classroom courses in chemistry and related subjects, or it may be just through general work experience which usually takes a longer time. The best place to learn the trade is in a job shop, because of the great variety of work done. Advanced courses in chemistry and related subjects are considered almost indispensable for promotion to supervisory positions, and even elementary high school chemistry and physics will be helpful in learning the work. Tank operators learn to work on the plating tanks under the direction of a plater in about 8 months, but they have little understanding of the processes involved and are not able to operate the tanks without supervision.

### *Outlook*

Not many openings for trainee platers are expected in the next year or two. The demand for many electroplated products, such as parts for automobiles and electrical appliances, should continue at high levels for several years but the production of some items such as costume jewelry has already fallen off from the high marks reached in the early postwar period.

The longer-run outlook for electroplating and for platers is generally favorable. Plating should continue to have an important place in the production of the many metal products where it is now used. There is no marked trend toward substituting other finishing methods for plating. Neither are there any important technological changes in prospect which would significantly reduce the number of platers needed in electroplating processes. Many of the larger shops use automatic conveying devices to carry the plated articles through the plating tanks and other parts of the process, and this development may be extended to additional plants. However, this equipment tends to displace many of the helpers and laborers from the plating process more than the skilled platers who direct it.

As many as 4,000 platers are now employed, plus a somewhat larger number of plating-tank operators. It is likely that there will not be any substantial increase or decrease in the number of jobs



COURTESY OF NATIONAL ARCHIVES

Electroplating is done by immersing an article in a liquid solution containing the plating metal and passing an electric current through the solution.

over the longer run. Most of the job openings will result from death or retirement of those in the trade. The use of electroplating is closely tied to general business conditions, however, and slumps in business activity cause temporary declines in the employment of platers.

Plating establishments are found throughout the country, but many are concentrated near the metalworking industries, particularly the automobile industry. As a result most of the jobs will be found in the Midwestern States, especially Michigan, Illinois, and Ohio, and many of the remainder in the Middle Atlantic and New England States. Although it still has fewer plating jobs than many of the Eastern States, California grew in importance as a plating center during the war.

### *Earnings and Working Conditions*

Recent earnings data are not available for many of the industries in which platers are important. In January 1945, the straight-time earnings of plating tank operators in job shops, averaged \$1 an hour. In October 1946, tank operators in the machinery industries in large cities averaged \$1.30

an hour. Earnings for fully qualified platers would be somewhat above these figures. Since the dates specified there have been general wage increases in these industries. During 1947 there was a minimum rate of \$1.25 per hour for platers in the shops in the New York metropolitan area which are members of the Masters' Electro-Plating Association, with an average of perhaps \$1.40 or \$1.45 per hour, although some of the more skilled men were earning much more.

Plating work involves certain hazards in that strongly acid, alkaline, or poisonous solutions may

be used, and there may be noxious fumes. However, injury from contact with chemicals can be avoided with reasonable care, and it is possible to eliminate fumes by proper ventilation.

Many platers are members of trade-unions. Some belong to the Metal Polishers, Buffers, Platers and Helpers Union (AFL) while others are covered by CIO unions such as the United Automobile, Aircraft, and Agricultural Implement Workers which organize all the workers in a plant rather than only those in particular occupations.

## Plastics Molding Machine Operators

(D.O.T. 7-10.014 and .016)

### *Outlook Summary*

Prospects are for a sharp rise in employment during the next few years in this relatively small occupation. Thereafter, a gradual increase in the number of jobs is expected, with good chances for continued employment for those entering this occupation.

### *Nature of Work*

These workers operate compression, injection, or extrusion molding machines which form plastics articles or parts. Most molding machine operators are semiskilled workers. Their basic duties are to feed plastic materials into the molding machine, start the machine, and take out the molded pieces. A set-up man makes ready the machines used by the operators, setting the controls and positioning the molds. The operator watches the process and calls his foreman if anything goes wrong. A few molding machine operators have jobs requiring greater skill. These are the so-called hand molders, who set up their own machines and assemble the molds by hand.

### *Where Employed*

The great majority are employed in plastics-molding plants making plastic parts to order for other firms or making finished plastics articles for sale. Other molding-machine operators work in plastics departments of companies which make plastics parts for use in their final products, such as electrical appliances, radios, or automobiles.

Plastics-molding plants are located principally in the important industrial regions of the country, near the main users of their products. The largest number of jobs is in New York, New Jersey, Massachusetts, Illinois, Ohio, Connecticut, California, Pennsylvania, and Michigan.

### *Training and Qualifications*

Usually, no previous experience or special training is required to obtain the job of the molding-machine operator. The general practice is to hire inexperienced persons and train them on the job. The training period varies from the 2 or 3 weeks necessary to learn the operation of the more automatic machines to the 12 to 18 months needed to become a skilled hand molder. There are a number of trade schools in the plastics field which give training in the operation of molding machines as part of their courses. However, the large majority of plastic molding-machine operators have not had such courses nor are they generally necessary to obtain jobs of this kind.

With little additional training, workers can transfer from one type of molding machine to another, e. g., from compression to injection machines. Average strength is enough to do this work. About one-sixth of the operators are women.

### *Outlook*

In the next 2 years, it is expected that there will be several thousand new openings in this occu-

pation. Thereafter, a continuing, although more gradual, rise in employment is likely, so that those entering the occupation during the next few years will have very good chances for continued employment. At the end of 1946 there were about 15,000 molding-machine operators employed, nearly three times the number in 1939 and higher than the wartime peak. Although the output of molded plastics is the highest in history, production is expected to increase greatly, because of heavy demand for molded plastics parts for such products as automobiles, aircraft, and electrical equipment, and because of the anticipated development of new uses for plastics. However, employment of molding-machine operators will increase less rapidly than plastics production because of the greater efficiency of the newer molding machines and methods.

#### *Earnings and Working Conditions*

In the early part of 1948 experienced men operating plastics-molding machines earned from \$1 to \$1.50 an hour (including incentive pay and bonuses for working second and third shifts, but not including overtime pay). Earnings of women were usually 5 to 20 cents an hour less than those of men. Beginning pay for inexperienced workers ranged from 75 cents to \$1 an hour.

A molding-machine operator may be promoted

to set-up man or to molding-room foreman. Plastics molding is not seasonal, and molding-machine operators generally work the year round.

Working conditions in plastics-molding plants are usually good compared with factory work in general. However, the molding department tends to be noisy, and it may be quite hot next to the molding machines. The rate of disabling injuries in molding plants is considerably under the average for manufacturing industries as a whole. Most plastics-molding plants operate more than one shift; three-shift operation is the most common.

There is no craft union of plastics molding-machine operators. However, about half of the plants in which molding-machine operators work are unionized. Locals of various CIO and AFL unions and some independent unions have organized plastics-molding plants.

#### *Where To Get Additional Information*

U. S. Department of Labor, Bureau of Labor Statistics, Employment Outlook in the Plastics Products Industry. Bulletin No. 929; Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., 1948. Price 15 cents.

*See also:* Finishing Jobs (Plastics Molding).

## Finishing Jobs (Plastics Molding)

(D.O.T. 9-10.10)

#### *Outlook Summary*

Prospects are for a sharp rise in employment during the next few years. Thereafter, a gradual increase in the number of jobs is expected, with good chances for continued employment for those entering this field of work.

#### *Nature of Work*

These workers perform a series of finishing operations which are needed to prepare most molded plastics articles for use. There are many different jobs in the finishing room. Bench grinders hold molded articles against rotating abrasive wheels to remove excess material. Hand filers

(or burrers) smooth edges and remove material, using hand files or carving spindles. Buffers and polishers polish articles by holding them against rapidly rotating wheels. Assemblers put together plastics pieces, using screw drivers, clamps, and pliers. Drill-press operators drill holes in plastic pieces and trim excess material from the holes. Tumbler operators run power-driven wire barrels in which plastics pieces are revolved in order to knock off excess material.

#### *Where Employed*

The great majority are employed in plastics-molding plants making plastics parts to order for

other firms or making finished plastics articles for sale. Others work in plastics-molding departments of companies which make plastics parts for use in their final products such as electrical appliances, radios, or automobiles.

Plastics molding plants are located principally in the important industrial regions of the country, near the main users of their products. The largest number of jobs is in Massachusetts, New York, New Jersey, Illinois, Ohio, Connecticut, California, Pennsylvania, and Michigan.

#### *Training and Qualifications*

Because the jobs are easy to learn, unskilled, inexperienced workers are hired. Training to use the various machines and tools is given on the job. Usually there are no educational requirements for new workers and average strength is sufficient. About three-fourths of the finishing-room workers are women.

#### *Outlook*

In the next few years the outlook is for a sharp increase in the number of finishing-room workers in plastics-molding plants, with several thousand new openings. Over the long run a continuing, but gradual, rise in employment is likely so that those entering this field of work during the next few years will have good chances for continued employment. At the end of 1946, there were about 13,000 finishing-room workers, nearly three times the 1939 number and more than the wartime peak.

Although the output of molded plastics is the highest in history, production is expected to expand because of heavy demand for molded plastics parts for such products as automobiles, aircraft, and electrical equipment, and because of the anticipated development of new uses for plastics. However, employment will increase less rapidly than production because of increased mechanization of finishing operations and improved molding techniques which reduce the amount of finishing necessary.

#### *Earnings and Working Conditions*

In the beginning of 1948, workers in the various finishing operations usually earned from 85 cents to \$1.20 an hour (including incentive pay and bonuses for working second and third shifts, but



COURTESY OF U. S. OFFICE OF EDUCATION

A compression molding-machine operator feeds plastic materials into the molding machine, starts the machine, and takes out the molded pieces.

not including overtime pay). Beginning rates for inexperienced workers were as low as 60 cents an hour.

Working conditions in plastics-molding plants are usually good compared with factory work in general. Finishing rooms are generally well lighted and adequately ventilated. The rate of disabling injuries in molding plants is considerably under the average for manufacturing industries as a whole. Most plastics-molding plants operate more than one shift; three shift operations is the most common. Plastics molding is not seasonal, and finishing-room workers usually have work the year round.

About half of the finishing-room workers are members of unions. Locals of various CIO and AFL unions and some independent unions have organized plastics-molding plants.

#### *Where To Get Additional Information*

U. S. Department of Labor, Bureau of Labor Statistics, Employment Outlook in the Plastics Products Industry. Bulletin 929; Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., 1948. Price 15 cents.

See also: Plastics Molding Machine Operators, page 351.

## Bakers

(D.O.T. 4-01.100 to .800; 4-02.151, .311, and .321)

### *Outlook Summary*

Chances for a job as a baker are good in some localities where bakeries are still short-handed. After the next year or two openings will not be numerous although replacements will be needed from time to time.

### *Nature of the Work*

Although the name is often given to a great number of bakery workers, a baker actually is one who has mastered all phases of bakery work and can perform any or all the duties involved in the preparation of bakery products. In small establishments, where the work is done mostly by hand, the baker usually makes a variety of products and performs all parts of the work. Elsewhere, the extent to which a man must specialize is determined by the kind of establishment he works in. In large establishments, where machines are used extensively, the baker's work, even though his training and skill qualify him as an all-round baker, is limited to one type of product such as bread, cake, or pie. Moreover, he generally specializes in one phase of making the product such as mixing, dividing, or baking. If so, he is usually known by the process in which he specializes, such as the "mixer" who measures and mixes ingredients, the "ovenman" who controls the baking and the "bench hand" who molds and divides the dough preparatory to baking. The bench hand's job has been further specialized. In the larger bakeries, the work is usually done by "molders" and "dividers."

Not considered as bakers are the other bakery workers, a sizable number in all, for whom as a whole the outlook is more promising. Some are specialists, such as icing makers; others are machine operators (slicing-machine operator, for example) and a large number are miscellaneous helpers and laborers. Nearly all learn how to do the work on the job rather than by formal apprenticeship.

### *Where Employed*

The largest single group of bakers is employed in shops which make baked goods for both wholesale and retail distribution. The next largest group works in bakeries which sell their products at wholesale only. Most such bakeries are large and highly mechanized. Other bakers work in the great number of shops which distribute their products solely through their own retail outlets. Specialty bake shops, which specialize in foreign or native fancy baked goods, and chain stores are prominent in this category. The remainder of the bakery workers—a comparatively small part of the total—are employed in restaurants, hotels, and institutions. Their products are consumed on the premises.

### *How To Get Into the Trade*

All-round bakers usually learn the work by serving a 3-year apprenticeship. Although, in the past, bakers sometimes got their start as helpers, nowadays relatively few helpers get the opportunity to do the increasingly difficult and important tasks which would round out their knowledge and experience in the trade.

### *Outlook*

The amount of bakery products consumed is expected to increase during the next several years, but the number of bakers needed is not likely to be much larger than at present. Much of the expansion—especially in large cities—will be accomplished by the use of additional machines and other technological innovations which reduce labor requirements.

About 2,000 to 3,000 bakers die or retire from the trade each year throughout the country. Replacements for them will represent the best chances for new workers to get into the trade. There are openings too for foremen bakers. Such men, who know and can do the work of the skilled baker, and in addition have some vocational training in the

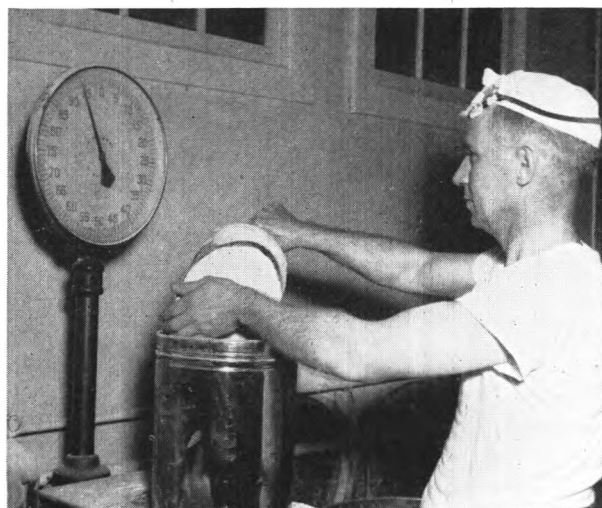


chemistry and mechanics of modern mechanized baking, are needed to fill supervisory and managerial positions.

Experienced journeymen bakers with opportunities restricted by the growth of large mechanized establishments will find their best prospects for jobs in specialty shops rather than in the general retail bakery. Establishments like these which specialize in foreign or native fancy pastries have the best chance of existing along with the larger mass-production bakery in large cities. Opportunities for bakers in the smaller bake shops will be limited by the continued encroachment of the large mass-production bakeries on the markets of small nearby bakeries.

### *Earnings*

There is wide variation in bakers' earnings depending upon the locality of the bakery, the size of the bakery, and upon the product turned out. Recent earnings data are not available but in July 1945 bench hands averaged, throughout the country, \$1 per hour. The average straight-time hourly rate for ovenmen was 94 or 96 cents, depending on whether they worked with cake or bread. Mixers' rates averaged 96 and 98 cents; those working with cake batters averaged 2 cents



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Many bakers have specialized jobs, such as measuring and mixing ingredients.

above the dough mixers. The all-round baker usually makes more than the man who specializes.

Although more recent wage rates by individual occupations are not currently available, the extent to which earnings have increased recently is indicated by the fact that between July 1945 and November 1947 the average hourly earnings for all workers on bakery products rose from 87 cents to \$1.12 (including any extra pay for overtime, bonuses, etc.).

## Meat Cutters

(D.O.T. 5-58.100)

### *Outlook Summary*

Outlook for the next several years very favorable for workers who want to learn the trade. In the long run, technological developments may gradually reduce employment of meat cutters.

### *Nature of the Work*

Meat cutters carve pieces of meat from animal carcasses, or from precut quarters of beef, lamb, veal, or pork—using a knife, saw, or cleaver. They may also dress fish and poultry and make sausage, meat loaf, and other special products. The meat cutter in the retail store usually takes on the duties of a sales clerk in addition to cutting meat. He

displays and sells meat and suggests various cuts to the customer. If he is a proprietor of a small shop or a manager of a meat department in a large, independently owned store, the meat cutter buys and prices the meat.

### *Where Employed*

Meat cutters work in retail meat markets, in grocery stores with meat departments, in wholesale supply houses, and—to some extent—in hotels and restaurants. The bulk of them are employed in meat markets and grocery stores. However, wholesale supply houses hire quite a few meat cutters to divide whole carcasses into quarters for meat retailers who request this service, or to carve

steaks, chops, roasts, etc., for restaurants, hotels, and institutions. Some of the larger hotels and restaurants employ their own meat cutters instead of following the usual procedure of buying precut meats.

### *Training and Qualifications*

The meat cutter learns his trade on the job, usually in 2 or 3 years' time. Chain stores, and some of the larger independent meat markets and grocery stores have formal training programs. But many meat cutters pick up the trade as butchers' helpers or as part-time workers in butcher shops. Vocational schools in some cities offer instruction in meat cutting.

### *Outlook*

Meat sales—and consequently the number of available jobs for meat cutters—will be considerably higher than prewar for the next several years. The demand for other foods, such as grains, fruits, or vegetables, is only slightly affected by good or bad business conditions. Meat sales, however, are especially large in prosperous times, unless high prices reduce consumer demands. During the war, when meat supplies were short, the increased demands for meat were not fully satisfied. When meat retailers have plenty of meat, more should be sold than ever before, and employment opportunities for meat cutters will be numerous. Veterans returning to the trade, plus those who received in-service training in meat cutting, have only partly met the need for new workers. Several thousand additional openings for newcomers to the trade will arise during the next few years.

Looking farther ahead, it is probable that technological developments will tend to reduce the

size of the meat-cutting trade. One of the most significant is the more extensive use of electric meat-cutting machines, already installed in some of the larger retail shops. In some instances, time spent in meat cutting has been reduced by half, or even more. Some stores, especially chain stores and other large establishments, are using persons not qualified as meat cutters to sell the meat over the counter, and are having their meat cutters spend most of their time cutting up meat, rather than waiting on trade. Stores using this system need fewer meat cutters than they did before. Other developments, already under way, are the large-scale production of dehydrated and frozen meat products which are processed and packaged in packing plants.

### *Earnings*

In the larger cities, experienced meat cutters make \$60 to \$80 for a 40- to 48-hour week. But in the small cities and towns throughout the country, they make less and frequently work much longer hours.

Although the hourly pay of the average meat cutter is lower than that of many other skilled workers, his annual earnings are comparatively good. His work goes on steadily the year round without much seasonal slack in activity.

Many meat cutters look forward to eventually opening their own shops. It should be noted, however, that the average meat-market proprietor does not make a lot of money. Owners of the larger shops have high incomes, but the small markets greatly outnumber the larger ones. Much depends, of course, upon the location of the meat market and upon the owner's judgment in buying and pricing meats.

## Mold Makers (Glass)

(D.O.T. 4-75.010)

### *Outlook Summary*

A few openings for new workers in next several years. In the long run, there will be steady employment in this small occupation.

### *Nature of Work*

The mold maker in the glass industries is a skilled craftsman who makes the forms which are used to fashion various glass products such as bot-

tles, jars, electric bulbs, etc. The molds must be precisely accurate to insure that the products will all be uniform. Most of the machines used to turn out glass products have a battery of several molds all alike and each new mold before it is set in the machine is carefully checked for exactness both in size and shape.

The mold maker who turns out the metal molds for glass is essentially a machinist. He begins with a blank iron casting and, following a pattern or blueprint, uses an engine lathe, shaper, drill press, and other metalworking machines to produce one or a large number of molds, all identical in size and shape. Sometimes the molds are not made in the plant of the glass manufacturer, but are ordered from other sources.

Although molds are essential in forming glass products, they are used over and over again and last a considerable time. Repair work is not frequent. Consequently mold making in the glass industry is a very small occupation—less than 2,000 workers in all.

#### *Where Employed*

One of the largest divisions of the glass industry is that devoted to making molded glass products. At one time, all blown or hollow glassware was made by hand. Now, molds are carefully designed and fabricated for use in the highly complicated machines which make glassware automatically. Some of the molds, such as those for food and beverage containers, are comparatively simple. During the war many such containers—and their molds—were standardized by Govern-

ment regulations. Others, like the molds for Christmas tree decorations, fancy ornamented glass bottles, and optical glass mean intricate and painstaking work. For pressed glass products the molds often carry a pattern on the inner surface.

There is a marked concentration of the branch of the glass industry employing mold makers in four States—Pennsylvania, West Virginia, Ohio, and Indiana. It is here that the few opportunities for new workers will be centered.

#### *Outlook*

There are some employment opportunities for additional mold makers, but these are limited in number, because of the size of the occupation. During the next few years an appreciable expansion is expected in the glass industries as a whole, principally as a result of the wider use of glass products. Some glass manufacturers have reported shortages of mold makers. Yet current needs could probably be met with a couple of hundred additional mold makers. Openings to replace those who leave the occupation for one reason or another will be very few because of the small size of the occupation.

#### *Earnings*

During the early part of 1947 earnings of journeyman mold makers averaged about \$1.55 an hour.

*See also:* Mold Makers (Structural Clay Products).

## Mold Makers (Structural Clay Products)

(D.O.T. 4-66.911)

#### *Outlook Summary*

Because of its small size this occupation cannot absorb many newcomers. Some of the few openings will be filled by upgrading other workers.

#### *Nature of Work*

The mold maker in the structural clay products industries is a skilled artisan who specializes in

making metal or wooden molds for shaping clay products.

For metal molds, the worker marks out the metal plate or lighter metal sheets and cuts them to the necessary size and shape. He then assembles the parts and screws them into place. Making wooden molds is much the same except that lumber is used instead of metal. The wooden mold maker often is a journeyman carpenter and usually performs

general maintenance carpentry about the plant, in addition to making repairs on old molds as the need arises. The metal molds are fabricated by specialists in metal work who, on heavier metal plate, must perform simple cutting operations with a milling machine, use a drill press, and so forth. When he works with lighter metal sheets, the mold maker must use the ordinary tools of the sheet metal worker's trade—power shears, metal saws, and sometimes a brake for bending and shaping the metal sheets.

Although essential in forming clay products, most of the molds, particularly those made of metal, are used over and over again and last a considerable time. Repair work is not frequent. Often the mold is made by a worker who spends most of his time turning out the finished clay product and only occasionally is called on to fashion a new mold. Consequently mold making is a very small occupation—less than 1 percent of the total employment in the industry. The total now employed throughout all structural-clay-products plants probably numbers considerably less than a thousand. Wood mold makers generally outnumber metal mold makers, about 4 to 1.

#### *Where Employed*

Although clay-products manufacturing establishments are located in every State there is a marked concentration of this industry in the States along the Atlantic coast from New York to Georgia, and in the Great Lakes region.

#### *How To Enter the Occupation*

Depending on the type of mold, the mold maker

is essentially a carpenter or a sheet-metal worker; workers trained in these trades would need little additional training to qualify. In fact quite a few mold makers are workers with some kind of former experience in these trades. Otherwise the jobs are generally filled by transferring workers from other work in the plant and giving them the necessary training on the job.

#### *Outlook*

Employment opportunities for additional mold makers will be limited. An appreciable expansion is taking place in the structural-clay-products industries as a whole, due principally to the anticipated high volume of construction. But the expected expansion can be met with only a few additional mold makers. Replacements such as are needed from time to time for workers who retire, die, or change to new jobs will likewise be negligible.

#### *Earnings*

In October 1945, average earnings in the structural-clay-products industries were 97 cents an hour, straight-time, for mold makers in wood; and \$1.07 an hour for workers in metal. Since October 1945, there have been substantial increases in the average hourly earnings of the workers in the structural-clay-products industries.

Employment in the clay products industries tends to be seasonal, with a slack period occurring during the winter months.

*See also:* Mold Makers (Glass), page 356.

## Painters, Spray

(D.O.T. 7-16.210)

#### *Outlook Summary*

Outlook poor for new entrants; some experienced workers will be unable to find jobs in this occupation.

#### *Nature of the Work*

Spray-gun painters are semiskilled workers employed in manufacturing plants. They paint all

kinds of manufactured articles on a mass-production basis. These products include automobiles and automotive parts, electrical and agricultural machinery, furniture and furniture parts, metal objects, and many other manufactured items.

The painter fills the spray gun with paint, attaches it to the air compressor, and turns a valve to regulate the pressure. Then he adjusts the nozzle and directs a fine spray of paint onto the sur-

face. Sometimes, in manufacturing, instead of using a spray gun, the painter applies paint or varnish by hand with a brush, or he may even dip the articles to be coated into the paint mixture. This work should not be confused with that of skilled hand painters who are used in some manufacturing processes and in construction.

### *Training and Qualifications*

There is no formal training for this work, but experience on the job is necessary to qualify as a painter in a manufacturing plant. Two weeks of experience may be sufficient for some jobs; other jobs may take up to a year.

Anyone going into this work should have the ability to stand on his feet for long periods of time, good lungs, a steady hand, strong fingers, and a good eye to see that there is a smooth surface on the articles being painted. He must not be bored by having to paint the same kind of objects over and over again. Those who dislike routine work will probably not like the work of a painter in manufacturing. Color blindness is disqualifying.

### *Where They Work*

Spray painters are employed in practically every industry. Most of them, however, work in those plants which produce furniture, store fixtures, electrical machinery and equipment, agricultural machinery and tractors, aircraft and parts, and auto-

mobile and automobile equipment and parts. This group does not include skilled painters employed in construction, automobile repairing, or furniture finishing.

### *Outlook*

For the next several years the outlook is poor. The industries where such painters work trained a great many new workers during the war when they were losing labor to other jobs or to the armed forces. The number of painters employed in manufacturing industries during the war far exceeded the 89,000 employed in 1940. After the war large numbers of painters were released from airplane factories, shipyards, and other such war plants and had to seek jobs elsewhere. Even plants which have reconverted to the manufacture of automobiles, machinery, household appliances, etc., often are not using all painters that they employed on war work.

If business conditions remain good and a high level of production is maintained, job opportunities for new painters will open up eventually, but there are now more manufacturing painters than there are jobs, and this situation is likely to continue for the next few years. Some plants do have openings from time to time because of workers taking other jobs and new workers may have a chance to be hired, especially if skill requirements are low.

## **Blasters and Powdermen**

(D.O.T. 5-74.010, .020, and .030; 7-74.010, .020, and .030)

### *Outlook Summary*

The fields of employment for the highly skilled specialists are relatively restricted, and a few workers can take care of the needs. Opportunities for the semiskilled blasters widely used in many fields of work are better, but such men usually need experience in a related occupation to be sure of full-time employment.

### *Nature of Work*

A blaster sets off charges of explosives to blast rock, coal, ore, or clay, in tunnels, mines, quarries,

and open excavations. His work ranges from blasting tree stumps for a farmer to shooting a well in the oil fields. The powderman is responsible for the storage and safekeeping of explosives, fuses, detonators, and other supplies. Sometimes he assists the blaster and frequently the two jobs are combined and handled by one worker.

The job of a blaster may be quite skilled or it may require comparatively little skill, according to the nature of the job and the kind of blasting to be done. Oil producers employ only skilled and highly specialized men, because faulty work, such as a misplaced charge, or too little or too

much explosives, can mean many weeks of wasted work. Other industries, such as construction, coal and metal mining, and stone quarrying may use both skilled and semiskilled workers—the latter often working as helpers or “powder monkeys.” Still other industries, such as fertilizer, logging, and clay quarrying, employ men with comparatively little skill in handling explosives because the blasting operations are relatively simple and limited experience is sufficient.

The number of blasters employed full time in any single industry is quite small. If the operations are large enough as in construction, for example, the company may have enough work to employ a full-time blaster—shifting him about from one location to another. On the other hand, the small construction contractor may have no one qualified to do blasting but instead use a subcontractor to do the blasting jobs as they occur.

#### *Training and Qualifications*

There are no requirements regarding schooling, especially for those whose work with explosives is not greatly specialized. On-the-job training is the usual means of learning to become a blaster. Whether it is a father teaching his son or an old worker passing along his accumulated knowledge to a newcomer, picking up the job is informal and the time required may vary quite a bit. Often, blasting is combined with and learned as a part of another job. Here again, on-the-job training is the prevalent method.

Learning the mechanics of blasting, other than getting the feel of handling such potentially dangerous material, is rather simple. But learning how to apply the principles of blasting to specific jobs in some instances requires considerable judgment. The expert blaster is considered an expert, not because of his blasting technique, but because he knows how to apply it most effectively to the job at hand. Things to be considered, like the depth, diameter, and location of the holes to be drilled, the kind of explosive, and the strength of the charge are all related to each other and vary with the character and face of the material to be blasted. Formal knowledge of geology and applied physics is often important, but practical experience gained over time can be substituted.

#### *Outlook*

Workers who considered blasting their principal or only occupation numbered less than 5,000 in 1940, but the number of workers who, as part of their job, use explosives for blasting in coal mines, on construction sites, in quarries, and on farms runs upward to a half-million people. Nearly all of them possess some skill in the handling of explosives, but the blasting they do generally does not require extensive knowledge or training.

Because blasting is only incidental to other work, even in those industries which do the most work with explosives, the prevalent practice to assure steady employment is to combine the job with another occupation. In coal mining, for example, the blasting is often done by drillers or coal loaders. In some mines the foreman does the blasting, assisted by a small crew of helpers. Only in large mines where a high degree of specialization is feasible are blasters used and even here the number employed is quite small. The same situation is customary in metal mining. In public construction also the blaster must usually acquire another occupation to hold a steady job. Only in quarrying and in the oil fields is the work generally recognized as a separate occupation, and even in quarrying the job is often combined with other work.

The outlook for blasters in the postwar period does not differ materially from that of prewar days. Opportunities for highly skilled technicians are extremely limited, and only a very few men with exceptional abilities will be able to find work. Best chances for such employment exist with concerns who do blasting jobs on a contract basis. But there are only a few scattered concerns in business and all are quite small. For veterans with military experience on blasting and demolition crews, the best chances for using their experience are to be found in mining, quarrying, and construction.

#### *Earnings and Working Conditions*

There is a very wide range in earnings. The highly skilled blaster called on to do a specialized job may be paid as high as \$25 a day or even more, but his chances for steady work are slight. If he works for a blasting concern his weekly salary may range from \$40 to \$75 a week or higher, de-

pending on the locality and the kind of work he is qualified to do.

The large number of workers who do blasting as part of their work in another occupation are usually paid the wage rate of the principal occupation. Those in mining for example, who work exclusively at blasting are paid wages generally comparable to the drillers. Only in a few cases is there a premium or bonus for their work with explosives.

The occupation is a hazardous one, principally because many workers who handle explosives have not been sufficiently trained. Since blasting, especially in mines, involves a risk to other workers as well, there is a movement to require certificates that the person is adequately trained to reduce hazards to a minimum. Such a requirement might eliminate some of the casual workers and widen opportunities for the more specialized persons.

## Chainmen, Rodmen, and Axmen

(D.O.T. 7-87.100 and .200)

### *Outlook Summary*

Opportunities good for limited numbers only.

### *Nature of Work*

Chainmen, rodmen, and axmen act as surveyor's assistants or helpers. Chainmen, under the direction of the surveyor, measure distances with a tape or chain. They work in pairs, with the head chainman establishing the most advanced measuring point, while the rear chainman holds the rear end of the tape at the last established measuring point. Rodmen hold the leveling rod at points designated by the surveyor or instrumentman for the purpose of obtaining the elevation of these points. On most surveying parties the duties of the rodman and chainman are interchangeable. Axmen (unskilled workers) cut and clear brush and trees from the line of survey. Their duties are sometimes performed by the chainman or rodman.

These workers are to be found principally in construction, Government, mining, railroad transportation, agriculture, or in the offices of surveyors who offer professional service to the public.

### *Training*

The work of chainmen and rodmen is semi-skilled and generally requires previous training or experience. Workers usually learn such jobs by obtaining employment as axmen and picking up related experience while in the field with surveying parties, or through classroom instruction in surveying.

### *Outlook*

It is estimated that, for at least the next 5 years, the high level of activity in private construction, together with increased Government spending for highway construction, soil conservation, reforestation, etc., will create a demand for chainmen, rodmen, and axmen considerably above the number now employed. But the total number of workers in each of the occupations is small and a few thousand additional workers will be sufficient to take care of the anticipated deficit between demand and available supply. Many veterans who received technical training and experience in surveying during military service will doubtless decide to take advantage of the opportunities in this field of civilian work, because in most instances no further training is necessary.

## Dry Cleaners

(D.O.T. 5-57.110)

### *Outlook Summary*

Good employment prospects for experienced workers in next few years; also some openings for newcomers. Long-run trend in employment gradually upward.

### *Duties*

These workers' main duty is to operate machines which wash garments in dry-cleaning solvents. This involves determining the proper amount of solvent and, in some cases, the mixture to be used for various fabrics, regulating the length of time each batch of garments must remain in the machine, and filtering the solvent to remove lint and other insoluble matter. Most plants employ only one dry cleaner, who supervises a small number of helpers in the operation of several dry-cleaning machines.

### *How to Enter*

On-the-job training is the customary way of learning the trade. The training requirements vary considerably among plants; a man may be classed as a fully qualified dry cleaner after anywhere from 6 months to as much as 2 years of on-the-job training.

This is ordinarily a man's occupation. A good many of the workers are Negroes.

### *Outlook*

Employment prospects are favorable for the next few years. The wartime shortage of younger workers caused by the draft and competition for labor from other industries was intensified by an increased demand for dry-cleaning service. Since the end of the war, many former workers have returned to dry-cleaner jobs, but there is still a shortage in some plants. The actual number of job openings will not be great, however, because



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

A dry cleaner's main duty is to operate machines which wash garments in dry-cleaning solvents.

of the fairly small size of the occupation; it is estimated that there were not more than 15,000 dry cleaners in the United States in 1940.

In the long run, a gradual increase in employment is likely. There has been a growing use of this service as the public has become more dry-cleaning conscious and as the proportion of garments which are nonwashable has increased. However, employment of dry cleaners may not increase to the same extent as the demand for the service, because the newer dry-cleaning machines can handle a greater volume of garments.

Jobs are to be found in all parts of the country. Most of the work is done in large towns and cities, primarily in the Northeastern, Midwestern, and Pacific Coast States.

*See also:* Spotters, Dry Cleaning, page 363.



## Spotters (Dry Cleaning)

(D.O.T. 5-57.310)

### *Outlook Summary*

Openings for both experienced and new workers during the next few years. Long-range trend upward.

### *Duties*

Spotters are employed in dry-cleaning establishments to remove spots from garments by applying moisture and chemical solutions. They have to determine the nature of each spot, select the proper solvent for the material and the spot, and rub or brush the stain until it dissolves. They may prepare their own solutions or use standard ones. Spotters may also wash or direct the washing of dirty garments in soap solution before attempting to remove spots (called wet cleaning).

In very small plants all spotting is done by one individual. In most plants, however, there are two types of spotters: fancy (silk) and rough (wool) spotters. Rough spotters are not as skilled as fancy spotters, because they work with garments which have a coarser texture and are more color-fast.

### *How to Enter*

From 9 months to as much as 3 years of on-the-job training is needed to qualify as a fancy spotter. In the course of his training, the fancy spotter learns rough spotting, wet cleaning, and dry cleaning. The training is generally of an informal nature, but a few plants have regular 3-year apprenticeship programs. To become a rough spotter requires only 3 months to a year of work experience.

In a number of plants, spotting, particularly rough spotting, is done by Negro workers.

### *Outlook*

Employment opportunities are expected to be good for the next several years. There was a



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Spotters are employed in dry-cleaning establishments to remove spots from garments by applying moisture and chemical solutions.

serious wartime shortage of spotters, which was intensified by the fact that few workers had been trained in the previous decade. The shortage to some extent remains. In addition, a number of spotters will soon reach retirement age. Thus, there will be some openings for trainees.

Longer-run prospects are for a steady growth in employment. There is an increasing demand for dry-cleaning service, owing in part to the increasing proportion of garments which are non-washable. However, this trend may be partly offset by greater use of fabrics which have been made stain and soil resistant by chemical treatment.

Spotters are employed in every State. Job openings will be most numerous in large centers of population, primarily in the Northeastern, Midwestern, and Pacific States.

*See also:* Dry Cleaner, page 362.

## Jewelry Workers

(D.O.T. 4-72.300 to .599; 6-72.300 to .599)

### *Outlook Summary*

Prospects fairly good for highly skilled men, but very few opportunities likely in next few years for partially skilled men and beginners. Women workers in demand for unskilled and semiskilled jobs except in slack spring months. Employment likely to be very much affected by any decline in general business activity.

### *Nature of Work*

Jewelry workers make rings, chains, bracelets, fraternal emblems, religious jewelry, brooches, earrings, and other ornaments either from precious metals such as gold, silver, platinum, or palladium, or from other materials such as brass, copper or plastics. They may also design the jewelry, do engraving, or do stone setting using precious, semiprecious, or synthetic stones.

Most jewelry workers are employed in manufacturing plants, though some large retail jewelry stores or large department stores have a few highly skilled men who specialize in making jewelry on order. Some plants produce both precious jewelry and medium- and low-priced articles; many specialize in one or the other.

The types of jobs differ from plant to plant, depending not only on the kind of article made but also on the method of production. As a rule, the more expensive the products, the more skill is required. In plants which manufacture precious jewelry, about two-thirds of the employees are skilled workers such as goldsmiths, platinum-smiths, stone setters, engravers, designers, filers, casters, and tool and die makers. Many of these shops are very small, having less than 20 workers, and the jewelers there generally have to be skilled all-round workers. Only about 1 out of 10 workers in these plants is a woman.

Shops making the lower-priced jewelry are generally much larger, the biggest employing as many as a thousand people. There is much mechanization and specialization and the bulk of the articles

are stamped out by machine. Only about one-fourth of the workers in such plants are skilled, their jobs being to design the pieces of jewelry, make the models or dies, or do engraving or fine casting, soldering, or bench work. Some of the more routine and simpler bench and soldering work is done by the less skilled workers, who also handle the presses and do other machine work. In the medium- and low-priced jewelry shops, about one-half the workers are women, who are employed primarily in semiskilled and unskilled occupations.

A good many jewelry workers have their own shops, often employing one to five other workers. Many of these small shops handle repair work in addition to manufacturing. Some men eventually acquire their own retail jewelry stores.

### *How To Enter*

The usual way to enter the trade is to start in one of the simpler jobs. The beginner may be a charger (setting up the work for soldering), do simple soldering work or polishing, or perhaps be on an assembling job. As he gains experience and skill, he may have a chance to move to more difficult work. The opportunity to become skilled is much better in precious than in lower-priced jewelry plants. Formal apprenticeships are not very widespread; those that exist last from 2 to 4 years, depending on the particular occupation involved. To become a highly skilled all-round jeweler usually takes still a few more years of experience.

Some employers believe that trade schools are not of much help and prefer instead to train workers themselves. Since the war, however, there has been an increase in the number of trade schools and improvement in the quality of their instruction. Nevertheless, additional practical experience is necessary after completing a school course in order to become a skilled worker.

Because this is light sedentary work, it has been found suitable for people with physical handicaps

of certain types. Many disabled veterans have been employed successfully in this field.

### *Outlook*

This is not a large field of employment. The total number of jewelry workers employed was only about 20,000 to 25,000 in 1939; it was somewhat higher in 1947 and early 1948.

Skilled workers are in demand and will probably continue to be needed for some time, especially in the case of toolroom workers such as tool-makers, hub and die cutters, and chain-machine mechanics. Other skilled workers, such as jewelers and those doing complicated soldering work, were likewise in great demand during the summer and fall of 1947, though the supply was adequate for the seasonally slow spring months. The trade is flooded with partially skilled men, however—men with a little training who had been able to obtain jobs during the war and early postwar period because of the severe shortage of skilled workers and the unprecedented boom in jewelry sales. With the return of many skilled workers from war industries and the armed services and the slight downward trend in jewelry sales since the middle of 1946, particularly in the high-priced lines, some of the less-qualified workers have been forced out.

In the semiskilled and unskilled occupations where women predominate, a marked shortage of workers during the rush seasons has developed since the end of the war. Turn-over is always high in these occupations and has been greater than usual in the past 2 years as many young women have left their factory jobs to go back to their homes. Some plants have been attempting to use young boys in place of girls in such unskilled occupations as foot-press operator, in order to relieve the shortage of women workers. The few jobs in the semiskilled and unskilled categories in which men are customarily employed have been easily filled from the reservoir of partially skilled men; positions of this type will not be easy for newcomers to obtain in the near future.

Training opportunities in the skilled trades will probably be still more difficult to find, since a considerable number of apprentices, including many disabled veterans, have been taken on since the end of the war.



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

This skilled jewelry worker is setting a diamond—a job that takes several years of practice to do well.

There are still some opportunities to open a shop of one's own. Highly skilled men with several years' experience will generally have the best chance of success. Several thousand dollars' capital is a minimum requirement.

The outlook in this field depends on general business conditions to a degree greater than in many other industries, since this is a luxury trade. Plants which produce medium- and lower-priced articles are somewhat less affected by unfavorable business conditions than those making more expensive jewelry. Moreover, in recent years, the former type of jewelry has been making steady inroads into the latter. This trend will tend to reduce the number of job opportunities for skilled workers. Technological changes—more mechanization and improvement in types of machines already in use—will probably also tend to reduce employment slightly over the long run.

Most jobs will be in the northeastern part of the country. The manufacture of precious jewelry is concentrated in New York and New Jersey, the manufacture of medium- and low-priced jewelry in New England, particularly in the Providence-Attleboro region. The cities with the largest number of jewelry workers are New York, Providence, Newark, and to a lesser extent Philadelphia, Chicago, Indianapolis, and Los Angeles.

*Earnings*

Average earnings of production workers in the jewelry industry in January 1948 were \$51.54 for an average workweek of 42 hours. It should be noted, however, that this average represents some overtime and includes the exceptionally high earnings of top-skilled men.

During the late winter and spring months when work is slack, many employees are laid off. This is especially true of semiskilled and unskilled workers. In the case of highly skilled men, many employers prefer to keep a small number of workers on the pay roll for all or most of the year and have them put in a lot of overtime during the busy fall season.

*Where To Go for More Information*

The following organizations may be helpful in providing information on job opportunities, training, and related matters:

International Jewelry Workers Union, AFL  
Suite 825  
551 Fifth Ave.  
New York 17, N. Y.

New England Manufacturing Jewelers' and Silversmiths' Association  
Sheraton-Biltmore Hotel  
Providence 2, R. I.

Playthings, Jewelry and Novelty Workers International Union, CIO  
225 Lafayette St., Room 606  
New York 12, N. Y.

## Dental Mechanics

(D.O.T. 0-50.06)

*Outlook Summary*

Job prospects fairly good for highly skilled, experienced men. Occupation now overcrowded with less skilled workers, and situation likely to become worse in next few years. Slow increase in employment probable in long run.

*Nature of Work*

Dental mechanics (often known also as dental technicians) make and repair, according to dentists' specifications, dentures, bridges, inlays, and other dental restorations. They range in skill from semiskilled assistants in such jobs as plasterman, polisher, and packer to highly skilled mechanics such as set-up men and head casters. Mechanics usually specialize in one of three major types of work: (1) Rubber and acrylic, (2) gold and nonprecious metal casting, and (3) ceramics (hand-made porcelain work). However, in small laboratories they may have to do all three types.

Nearly 18,000 dental mechanics were employed in July 1947, according to one estimate. Of these, over 14,000 worked in commercial dental laboratories; the remainder (about 3,500) were employed directly by dentists. Many technicians have their own laboratories; in fact, almost all dental laboratories are owned by men who are or who were formerly dental mechanics. Laboratories vary in

size. The majority of commercial laboratories are small, employing one to five men; few laboratories have over 25 workers; the very largest employ not more than 300.

*How to Enter*

On-the-job training is the most practical and economical way of learning this craft. As a rule, dental laboratories prefer to train their own workers. There are some schools offering formal courses, but few of them give training that will be acceptable to most employers. One or two dental colleges now offer approved courses, however, and the number doing so may increase. Three to five years' work experience is needed to qualify as a senior mechanic, and generally 15 to 20 years to reach the highest level of skill.

*Outlook*

Employment in this occupation has risen sharply since the end of the war. In 1940-41 there were only about 15,000 workers in the trade, including some unemployed. The number employed dropped sharply during the war, but by mid-1947 had risen to about 18,000. However, the dental profession, upon which dental mechanics depend for business, has not expanded sufficiently since the war to provide full-time employment for all of the great

numbers of workers who have recently entered the field. Skilled and experienced men still have a fairly easy time finding jobs and will probably continue to find openings during the next few years. Jobs for partially trained workers are much more difficult to locate, and the situation will probably become even worse in the next few years because of the several thousand people now in training. Beginners seeking on-the-job training are likely to have an increasingly hard time finding openings.

Long-run prospects appear somewhat more encouraging provided general business conditions remain good. In response to a growing realization of the necessity for expansion of dental care, there will probably be a slow increase in the number of dentists (see p. 45), and, consequently, in the number of dental mechanics needed. In addition, there will be several hundred job openings each year as a result of deaths and retirements. Those dental mechanics who find jobs will have a good chance of steady employment over a long period of time, although a decline in general business activity would lead to a few lay-offs and to part-time work for some.

Although mechanics are employed in all parts of the country, the majority of jobs are in the larger cities. More than half the dental mechanics employed in 1947 were in the following 8 States: New York, Ohio, Illinois, New Jersey, California, Minnesota, Massachusetts, and Pennsylvania. In small towns, particularly in the Midwest, some dentists have their work done by an out-of-State

laboratory. Job opportunities in such towns will, of course, be very limited.

### *Earnings*

In 1945, typical earnings of skilled dental mechanics employed by others ranged from \$50 to \$70 a week, according to limited data for a few large cities. The highly skilled men earned much more. By early 1948, wage rates for skilled workers had risen considerably; the usual starting rate for learners was about \$25 a week in some large cities. Since the work falls off during the summer in most areas, annual earnings may be reduced by short lay-offs in that season. Earnings of self-employed mechanics vary considerably, depending not only upon the location of the laboratory and the individual's skill but also upon the number of men working for him.

### *Where To Go for More Information*

For more information on job opportunities, training, and other questions, one may write to:

Dental Laboratories Institute of America  
7 South Dearborn St.  
Chicago 3, Ill.

The *Journal of the American Dental Association*, in its issues of August 15, 1947, and January 1948, carried articles on the education and training of dental technicians. If this publication is not available at local libraries, it may be obtained from:

American Dental Association  
222 East Superior St.  
Chicago 11, Ill.

## Optical Mechanics (Ophthalmic)

(D.O.T. 5-08.010)

### *Outlook Summary*

Employment prospects for skilled mechanics fairly good in most parts of country in near future; newcomers and partially trained workers may have hard time finding jobs. Expanding employment expected in long run.

### *Nature of Work*

Optical mechanics (or opticians) are of two main types—lens grinders, who grind and polish

surfaces of lenses, and benchmen, whose duties include cutting the edges of the lens to desired shape and size and inserting it in the frame. Much of the work is precise, and it may require workers to be on their feet for extended periods of time.

Most lens grinders work for wholesale optical distributors. A few are employed in retail shops, but the tendency is for such shops not to do surface grinding but to send their work to a wholesale house. On the other hand, sizable numbers of benchmen work for optometrists and other re-

tail dispensers as well as for wholesale establishments. Those employed in retail shops often combine work in edging and fitting lenses with the actual dispensing of eyeglasses to customers. A good many optical mechanics who have the necessary capital are in business for themselves.

### *Training and Other Qualifications*

Two to three years' training and experience in the trade are necessary to become a fairly satisfactory surface grinder or benchman, and longer—perhaps two more years—to become fully qualified. In some shops, a formal system of apprenticeship prevails. Wholesale shops generally provide the best opportunity to acquire all-round skill and knowledge. Connecticut is the only State which licenses optical mechanics, but California and New York as well as Connecticut have legal requirements as to who may dispense eyeglasses.

### *Outlook*

This is a small occupation. In early 1948, only about 7,500 mechanics and apprentices were employed in wholesale optical establishments and not more than 20 percent additional full-time mechanics in retail prescription shops, according to one estimate. The current employment situation is much more balanced than during the war, when a marked shortage of skilled workers developed owing to inductions and enlistments into the armed forces and sharply rising demand for eyeglasses. An unusually large number of inexperienced workers were hired for training in an effort to relieve this shortage. As these new workers completed their training and veterans returned to their jobs, the shortage of skilled workers was

much relieved. However, skilled men should still be able to get jobs in most parts of the country, although labor surpluses are reported in some areas.

The number of people in training is now less than during the war, but it is still considerable. Newcomers and partially qualified workers may have difficulty finding employment in many areas.

Men able to find work or establish their own businesses may look forward generally to continued employment for many years. The trade is less affected by declines in general business activity than many other fields. In addition, provided that general economic conditions remain good, there is likely to be a continued increase in the number of eyeglass wearers—owing to the growing proportion of old people in the population, growing public awareness of the importance of proper eye care, and other factors. On the other hand, technological improvements will tend to reduce labor requirements. These developments promise to bring about such basic changes in the trade that it is important for new entrants to have good general training, since specialized training might become obsolete.

Jobs are to be found in most parts of the country. However, there will sometimes be fewer optical mechanics relative to demand—and, therefore, better employment and business opportunities—in small than in large cities.

### *Where To Go for Additional Information*

Optical Wholesalers National Association  
Times Bldg.  
New York 18, N. Y.

*See also:* Precision Optical Workers, page 368.

## Precision Optical Workers

(D.O.T. 5-08.071 and .081; 7-08.028)

### *Outlook Summary*

Very good employment prospects for top-skilled men; fairly good prospects for those with medium skill. Job chances for newcomers in semiskilled jobs not good in near future. Long-run employment trend upward.

### *Nature of Work*

These workers grind and polish optical elements—lenses, mirrors, prisms, and optical flats—for binoculars, telescopes, range finders, photographic equipment, and other highly accurate optical instruments. Much of the work is done to ex-

tremely close tolerances—much finer than in ophthalmic work. The group includes workers of several skill grades ranging from semiskilled to very highly skilled.

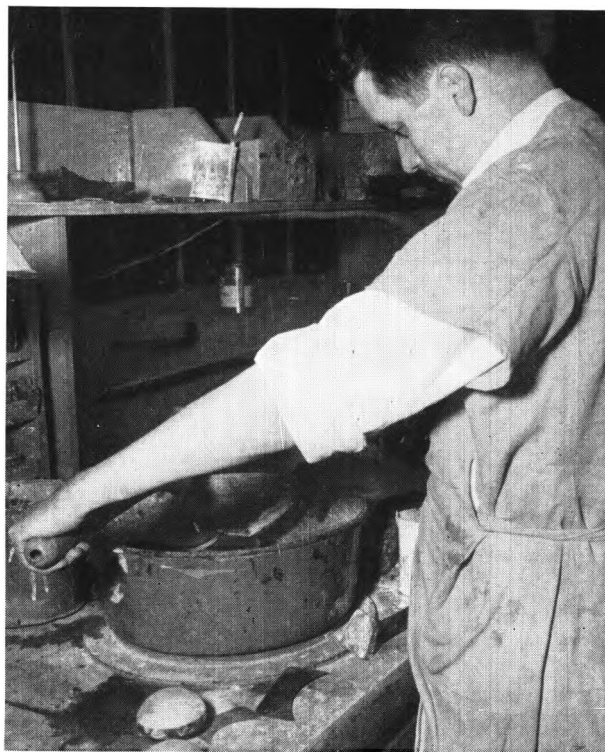
Most precision optical workers are employed in factories; others in Government establishments such as arsenals and navy yards, in small custom shops, and in a limited number of precision instrument repair shops. Some highly skilled workers are in business for themselves, doing custom work for various industries. In most factories the work is on a mass-production basis, and the bulk of the workers are semiskilled. However, some factories, as well as custom shops, produce optical elements in small numbers on special order; in such places practically all the workers are highly skilled, able to work to close tolerances and to perform all the various operations.

### *Qualifications*

To become a skilled precision optical worker, it is necessary to complete a 3- or 4-year apprenticeship or equivalent all-round on-the-job training. Learners usually are assigned to the rougher operations first and are set to work on the final polishing and correction of lenses only toward the end of their training program. To handle the most difficult and precise operations requires years of experience after completion of an apprenticeship. Semiskilled production-line work can usually be learned in a few months. Experience on the production line does not qualify a person as a skilled, all-round worker, although it may shorten the necessary apprenticeship period.

### *Outlook*

Employment of precision optical workers was below the wartime peak of 15,000 in early 1948, but far above the prewar level of only about 1,000 to 1,500. The increased employment during the war, in response to heavy military requirements, took place in the semiskilled categories; there were no substantial gains in employment of skilled mechanics. With the curtailment in military orders (which was offset only in part by increased production of cameras and other peacetime products) it was the semiskilled workers who were laid off. A few of these workers have been taken on as apprentices in custom optical shops; men with production-line experience are given preference as



PHOTOGRAPH BY U. S. DEPARTMENT OF LABOR

Precision optical worker grinding a lens blank.

apprentices if they are willing to accept the lower pay scale. However, most of the displaced wartime employees have left the industry. It is reported that some of them would like to return, and that these experienced workers will generally be given preference for any semiskilled jobs that may open up in the near future.

Employment of skilled precision optical workers has tended to increase rather than decrease since the end of the war. Government subsidized scientific projects are expanding and ordering more custom-made precision instruments; manufacturers in other industries are working to closer tolerances and need more special optical elements for precision measuring devices; other expanded and new needs for optical instruments have arisen. There are definite shortages of top-skilled men; a supply about equal to the demand in the case of men with medium skill.

The outlook is for continued increases in employment among skilled men. In the case of the semiskilled, employment may not rise as fast as production because of increased mechanization.

Factors which will make for expanding production in the industry are the further increases expected in scientific research and precision methods in manufacturing; the growing market for television receivers; and the growing foreign market for optical goods. Should there be a large rearmament program, this would create a great additional demand for optical instruments.

What job openings arise will be mainly in New

York State, where the large, long-established precision optical manufacturing firms are concentrated, and, to a lesser extent, in some other eastern seaboard States and California. Chicago is also emerging as a center of optics. Opportunities, particularly for skilled men, may be found near some of the universities and scientific and industrial research centers where custom shops are generally located.

## Watch and Clock Factory Workers

(D.O.T. 4-72.000 to .299 and 6-72.000 to .299)

### *Outlook Summary*

Good job prospects for experienced workers; some openings also for newcomers. Long-run trend in employment slowly upward.

### *Nature of Work*

There are many specialized jobs in watch and clock factories. The typical plant has many departments (spring, dial, plate, and so forth) and five major types of workers: (1) Machine operators who make the various parts; (2) parts finishers, whose work is done both by machine and by hand; (3) assemblers; (4) final finishers, timers, and adjusters; and (5) inspectors and supervisors. Most of the workers are semiskilled, and a very large number are women. The work differs somewhat from one plant to another, depending on the kind of timepiece made and also on the method of production. In factories which do not make all the parts for the finished timepiece but instead buy some or all of them, an especially large proportion of the employees do assembly work. Such factories may have no parts finishers and few, if any, machine operators.

### *How To Enter*

Beginners usually start out in one of the simpler jobs. It takes 3 to 6 months of on-the-job training to learn to perform such a job satisfactorily and at least 2 to 3 years to reach the highest level of skill. As a rule, work on the more expensive watches requires more skill than work on the

cheaper watches; and the latter in turn requires more skill than work on all except the most expensive clocks. Employees generally must have some additional training to transfer from one branch of the industry to another.

### *Outlook*

Employment of watch and clock factory workers is now higher than in any prewar year. In December 1947 the industry had about 28,000 production workers (of whom the great majority were in the skilled and semiskilled jobs referred to in this statement).

Manufacturers have a bigger demand than they can take care of, though they are producing at capacity. A few companies have built or are building new plants and training new workers to run them. Employment may continue to rise slightly until the new plants are fully staffed. Then it will probably level off and remain very high for at least a few years, provided that general economic conditions continue to be good.

There is likely to be considerable room for new entrants each year owing to turn-over. A large proportion of the workers in the industry are women, and great numbers have been dropping out to assume household responsibilities. Other employees have left to take jobs which involve less precise and exacting work; transfers of this type have been especially numerous during the last few years when jobs have been relatively easy to find.

Over the long run, employment will probably tend to rise slowly in all branches of the industry,



because of the increase in watch and clock ownership, which is anticipated as long as general economic conditions remain good.

Most jobs will be in the following five States—Connecticut, Illinois, Massachusetts, New York,

and Pennsylvania. Before the war, those five States employed about nine-tenths of all watch and clock factory workers.

*See also: Watch Repairmen, p. 226.*

## Linemen, Electric Light and Power

(D.O.T. 5-53.420)

### *Outlook Summary*

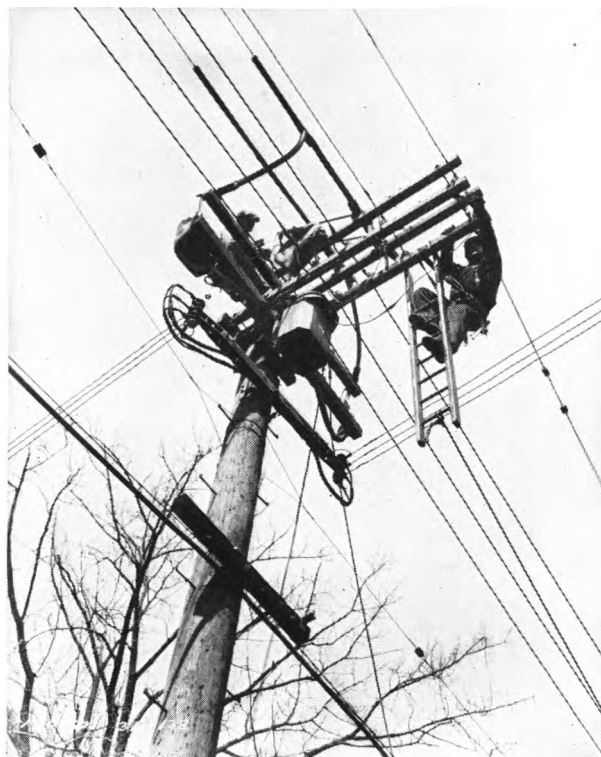
Good employment prospects during the next several years both for experienced workers and for new workers; over the longer run, there will be steady employment for experienced workers and a small number of openings for new workers.

### *Nature of Work*

Power linemen install and maintain the overhead wires and cables, and equipment used in transmitting and distributing electric power to consumers. Their work includes the stringing and restringing of wire spans and the mounting of cross arms and transformers, switches, insulators, and other equipment. Some linemen specialize in the construction of new lines, particularly the high-voltage lines which carry electric current over long distances and from power plants to substations. Others do mainly normal maintenance work on the lines and minor installations, such as the low-voltage lines leading from main lines to houses and stores. Some companies have crews of linemen to make emergency repairs, such as those needed when storms break down the lines.

### *Training and Qualifications*

A 4-year apprenticeship or the equivalent in other on-the-job training is usually required to become a journeyman lineman. Men trained as telephone linemen in the Army may receive some credit for this experience and thus reduce the length of the learning period for power-line work. A number of months' experience as a helper or groundman is often needed before entering lineman training. During the apprenticeship period, courses in elementary electricity, mathematics, blueprint reading, and safety practices are given. Some companies have recently set up special in-



Linemen mainly work at installing new lines and doing routine maintenance on existing lines. Repairing damage from storms is a smaller part of the job and is often done by special crews.

tensive training courses in actual line work which shorten the apprenticeship or learning period by as much as 2 years.

Because of the strenuous nature of the work, men must be in good physical condition. For this reason a man may not be able to work at pole climbing to as advanced an age as he might work in less physically demanding occupations.

### *Where Employed*

Most linemen work for privately owned electric power companies. There are also jobs for linemen

in electric power projects operated by the Federal Government, power systems owned by many cities and towns, and in rural cooperatives. Some linemen work for construction firms that erect and install power lines for electric companies and Government agencies, principally the high-voltage transmission lines. These workers move from one job to another as each is completed.

### *Outlook*

Good prospects during the next several years both for experienced workers and for new workers. Resumption of normal maintenance, increased construction activity, and extension of power lines to new consumers, particularly in rural areas, will increase the needs for linemen considerably above wartime levels. In the longer-run period there should be steady employment for experienced workers and a small number of openings for new workers. The expected continued ex-

pansion of power generation and distribution will cause small and gradual increases in employment of linemen, and in addition men must be trained to replace those leaving the occupation because of death, retirement, and changing to other jobs.

### *Earnings and Working Conditions*

Journeymen linemen in privately owned electric light and power companies earned an average of \$1.61 per hour, straight time, in March and April 1948. Most light and power companies provide annual vacations with pay, and many give pensions and sickness benefits.

Working conditions are often hazardous because of the extensive amount of climbing involved, outdoor work in all weather, and danger of electrocution and shock. Linemen may occasionally work long and irregular hours during storms, floods, and other emergencies to repair damage and restore service.

## Telephone Installers, Repairmen, and Linemen

(D.O.T. 5-53.030, .250, and .410)

### *Outlook Summary*

Good employment prospects in immediate future; fewer openings after backlog of orders for telephones is reduced. Employment likely to be relatively stable over long run.

### *Nature of Work*

Group includes station installers and repairmen, who install and maintain telephone equipment in private homes, offices, and pay telephone booths; PBX installers and repairmen, who work on private switchboard equipment; central-office repairmen, who do maintenance work on the telephone companies' central-office equipment; linemen, who string and repair wire and place cable; and cable splicers, who splice and maintain aerial and underground cable. Most workers in these occupations are employed by the associated companies of the Bell System, but some work for independent telephone companies, which have about one-sixth of the total telephones in the United States.

### *Qualifications*

High-school graduates are given preference for jobs in these occupations, and knowledge of basic principles of electricity is an asset. New entrants are usually taken on for general telephone work and are given all-round classroom and on-the-job training. Then, they are placed in the particular occupation where workers are needed at the time. They usually progress within a single craft, though men are often shifted from one type of work to another as need arises. It usually takes about 8 years to advance to the top of the wage-progression schedule in the Bell System companies. Some of the small companies also have progression schedules covering varied periods of time, while others promote workers on the basis of their individual competence. Veterans are usually granted some credit for time spent in the service.

### *Outlook*

Employment in these occupations is at the highest level in the history of the industry. Since the

war the number of workers employed in these occupations by the Bell companies has risen sharply; in early 1948, it was close to 110,000. Some of these companies were still expanding their work force, though many had passed their peak hiring rate. Replacement needs also provide sizable numbers of employment opportunities. The situation is similar in the independent companies.

The backlog of orders for telephone service is still very large, because new orders are being received nearly as fast as long-standing orders can be taken care of. The current level of employment is likely to continue as long as this backlog exists. Then the companies may find it necessary to reduce their forces by tapering off hiring or discontinuing it entirely for a while.

Over the long run, there will be a tendency for the telephone business to increase and employment to rise at a moderate pace as long as general economic conditions remain favorable. Should there be a decline in business activity, employment in the telephone industry would probably be less af-

fect than employment in many other industries, though during the thirties there was a great deal of part-time work and some lay-offs of telephone workers.

### *Earnings and Working Conditions*

Starting rates with Bell companies ranged from about \$30 to \$38 a week in early 1948, depending on the community. The highest salaries provided for by the progression schedules varied from about \$68 to \$84 (somewhat less for linemen). The standard workweek is 40 hours, but overtime is frequently necessary. Linemen have to work out of doors in all kinds of weather.

### *Where To Go for Additional Information*

People interested in employment with a telephone company should go to their nearest central office where they will be directed to the proper person to see.

*See also:* Central Office Equipment Installers, Telephone.

## Central Office Equipment Installers, Telephone

(D.O.T. 5-53.010)

### *Outlook Summary*

Some opportunities for newcomers in immediate future; shortage of job applicants in some localities, surplus in others. Employment now higher than ever before; likely to decline after backlog of work is reduced.

### *Nature of Work*

The group covered by this statement is engaged mainly in installing manual and dial switchboards and other equipment in the central offices of telephone companies. In general, the duties involve placing the equipment in location designated in floor plans, connecting the various units with cables, and adjusting the devices for maximum efficiency. The principal employer is Western Electric Co., a subsidiary of the American Telephone & Telegraph Co. The next largest is the American Equipment Co., which produces a good deal of equipment for foreign companies as well

as for independent telephone companies in this country. The associated companies of the Bell System also employ a small number of installers in large cities, to make relatively simple installations.

### *Qualifications*

Applicants must have at least a high-school education or its equivalent. Courses in electricity are an asset. Men with college education have an advantage in competing for advancement within the company, especially if they have engineering training. It is absolutely necessary that the applicant be willing to travel.

The Western Electric Co. gives new employees both classroom and on-the-job training. It takes about 6 years to work up to the top of the progression schedule. Some of the small companies also have progression schedules covering various periods of time, while others promote workers on the basis of their individual competence.

*Outlook*

Employment of central-office installers is at the highest level it has ever reached. It has been increasing rapidly since the end of the war, because the telephone industry has been engaged in the largest program of expansion in central-office equipment in its history. Opportunities for newcomers have not been as numerous as might be expected, however, because returning veterans have been reabsorbed without displacing men hired during the war and because material shortages have delayed the delivery of equipment. In some localities, the number of applicants for jobs with the Western Electric Co. is greater than the number of openings, but in others the company is having a hard time finding qualified help, as are the smaller companies.

Not much further increase in employment is anticipated. Future hirings will be largely to meet replacement needs. It is expected that the present high levels of employment will continue at least

until 1949 and perhaps longer, provided that the great backlog of demand for telephones persists. When this has been taken care of, employment will probably decline considerably and then become relatively stable.

*Earnings and Hours of Work*

For most installers, wages started at 80 to 90 cents an hour in early 1948, with increases up to a maximum of \$1.50 to \$1.66 an hour after about 6 to 8 years' experience. The standard workweek is 40 hours, but it is often necessary to work overtime.

*Where To Go for Additional Information*

People interested in employment as a central-office installer should go to the nearest central office, where they will be directed to the proper person to see.

*See also:* Telephone Installers, Repairmen, and Linemen, page 372.

## Armature Winders

(D.O.T. 6-99.011)

*Outlook Summary*

There will be a moderate increase in employment during the next few years with some openings for new workers; a slight drop in employment will occur thereafter, but the long-range trend is upward.

*Nature of Work*

Armature winders fit wires into the slots of armature cores of electric motors and generators. The armature is the moving part of a motor and generator. It consists of a metallic core and wire coils through which electric current flows. The armature winder may wind the wire coils onto the core by hand, by using a coil winding machine, or by inserting previously prepared wire coils into the slots of the armature core. He may also be required to cut and pack insulating material around and in the armature core.

Armature winders are employed in plants which manufacture small motors and generators. These plants make large quantities of standard motors

and generators, so that armature winding is mainly repetitive, and can be learned in a few months of on-the-job training. In motor-repair shops and in the manufacture of the larger specially designed motors and generators, motor repairmen or all-round assemblers do most of the armature winding as part of their broader jobs, and only a few armature winders are employed. About half of the armature winders employed are women.

Employment in the occupation is largely concentrated in a number of electrical equipment manufacturing centers, including such cities as Schenectady, N. Y.; Pittsburgh, Pa.; and St. Louis, Mo.

*Outlook*

During the next few years there should be a moderate increase in employment of armature winders and some opening for new workers. The production of small motors and generators has been maintained at a high level. Prospects are for a further increase in production, because of

the strong demands for many products containing small motors or generators, including automobiles, aircraft, farm machinery, tractors, refrigerators, and washing machines. As a result, motor and generator plants will be taking on additional workers during the next few years, including a number of trainees in armature winding. However, the total number of new openings for armature winders will be limited because of the relatively small size of the occupation—a total

of several thousand are employed throughout the country. Over a longer period, when output of automobiles and other products catches up with demand, there will be some decrease in the need for small motors and generators, and a decline in the number of jobs for armature winders will result. Thereafter, the long-range trend toward further electrification of homes and industry will tend generally to increase employment in this occupation.

# Agricultural Occupations<sup>1</sup>

## *General Outlook for Farming*

Farming is not an easy occupation. Many kinds require long days of hard work, especially during the growing and harvesting seasons. Investment and operating costs for adequate size units are high and, in many cases, risks are great. If these cautions are observed, farming offers an excellent opportunity for vigorous, intelligent operators. Farming is not just one occupation. There are many types of farms requiring different qualifications and presenting varied opportunities in different parts of the United States.

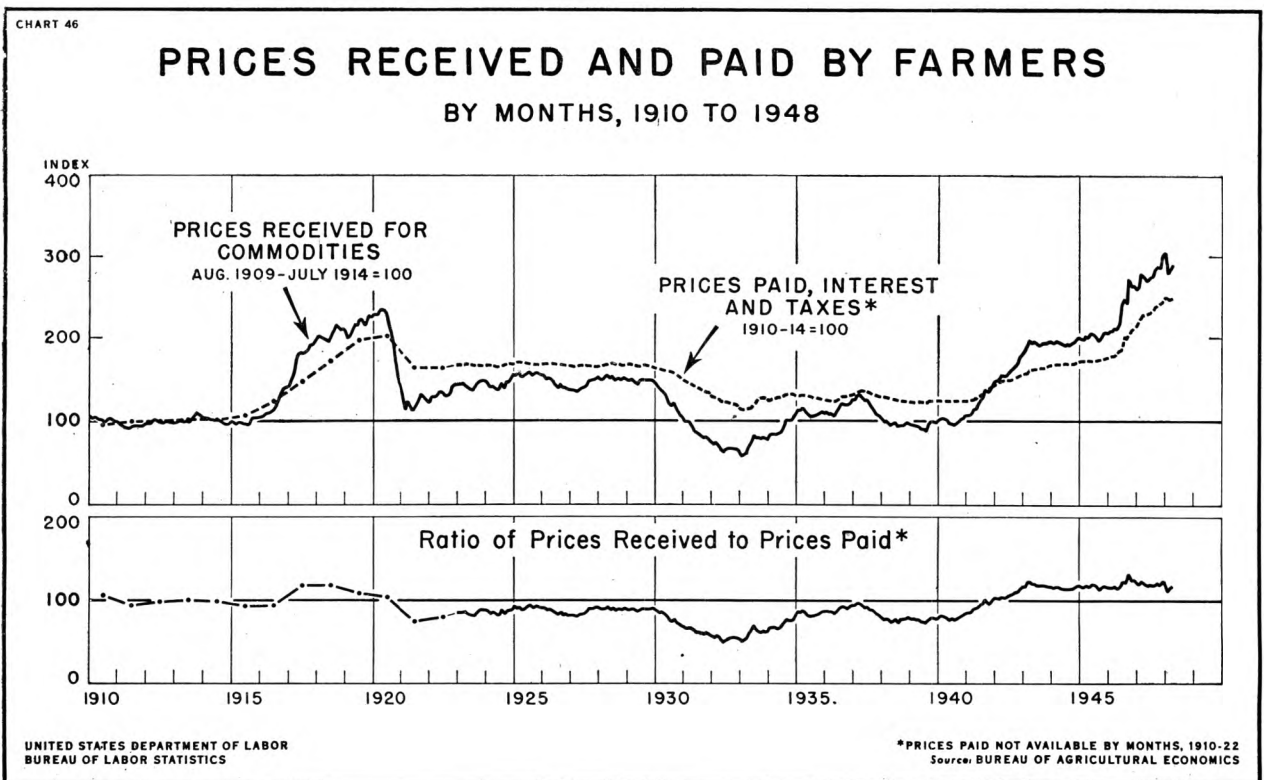
The following descriptive material is arranged by groups of States to enable some geographical

distinction among types of farms. This arrangement is unjust to the more commonly used generalized type-of-farming areas, such as the Corn Belt which stretches into parts of the Great Plains States and Lake States. However, it does allow more attention to the wide variety of farms appearing in all regions of the country and was selected largely for that reason.

### *Farming an Essential Industry*

Food production is an essential in our national economy and, today, is fairly well protected by the Nation in the interests of conservation and adequate supplies of food. However, there is a substantial turn-over in farm operators. As in

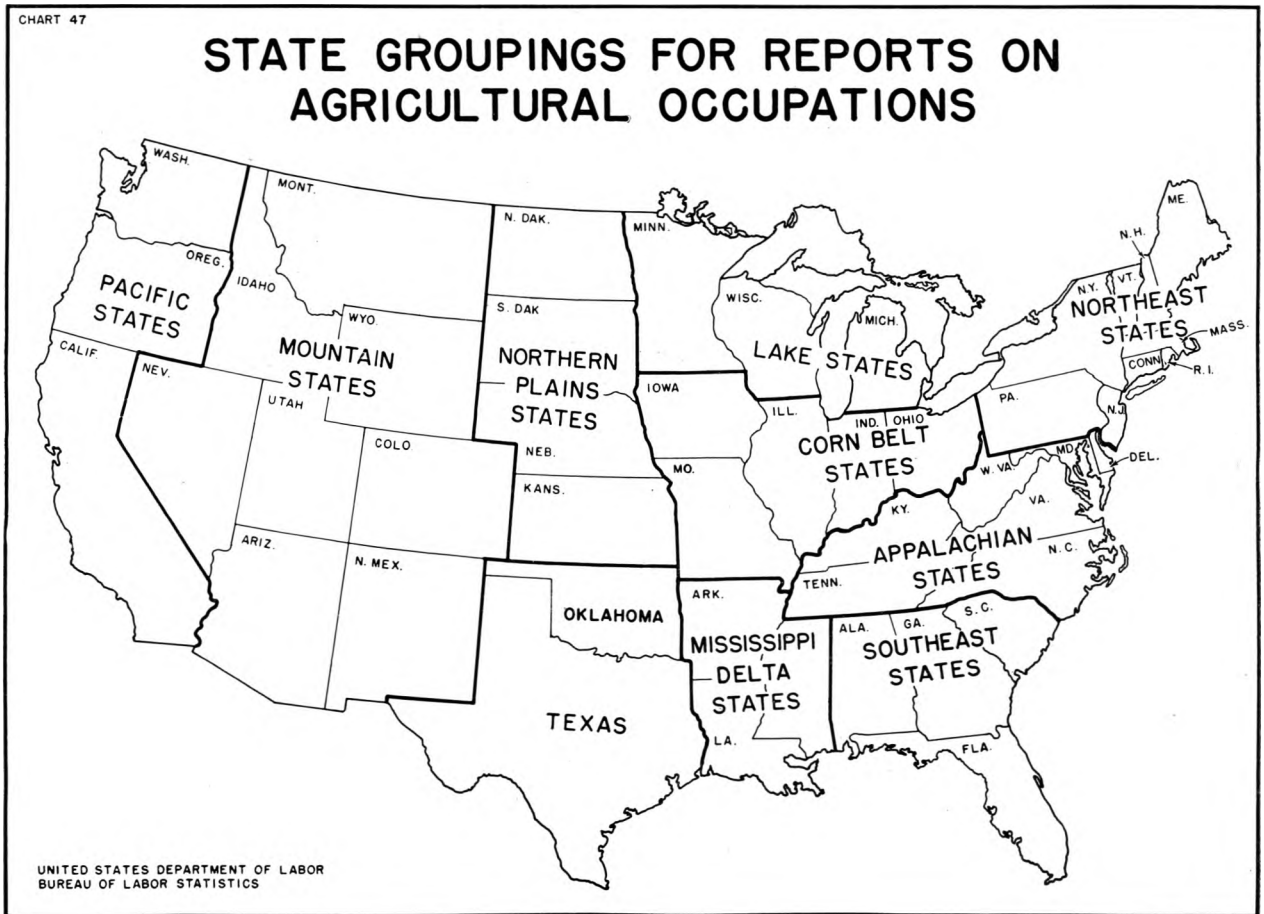
<sup>1</sup>This section was prepared by the Bureau of Agricultural Economics, U. S. Department of Agriculture.



any business, hundreds of farmers go broke each year. Many thousands are relatively inefficient, which is not amazing in view of the fact that 10 percent of our farmers produce over half our food.

Thousands of men are needed each year to replace the aged, the physically disabled (farm accident rates are high), and the economic casualties of bad financing or inefficient operation. In addition, there are thousands of farms that are too small or too poor in resources to offer an adequate living wage. However, these units may provide additional income to those receiving pensions or

Among widely varying factors to be considered in farm location are community facilities, including churches, schools, stores, transportation, recreation, entertainment, hospitals, and medical care. To some extent, facilities vary with the population; that is, more of them are available in the heavily populated areas. However, existence alone must be tempered by quality. Age, local customs, wealth, industry, kind of people, geography, and many other factors affect the acceptability of these facilities which, even in our great country, vary from excellent to very poor. Their impor-



annuities. Though cash income from these "part-time" units is small, they do offer low living costs in inexpensive residences and food products for family consumption. It should be noted that residences in some areas are quite expensive in comparison with total farm investment. This is particularly true in the Northeast and in suburban areas of all regions.

tance to satisfactory living warrants careful investigation of them as well as farming possibilities in final selection of a farm.

#### *Farm Finances*

The price of farms and the amount of money needed to start farming varies greatly. Potential farmers should not be discouraged by the high cost



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When choosing a farm, the family must be kept in mind. Schools, churches, and other community facilities are important in the choice.

of certain types of farms, particularly in the Midwest. Many financial aids are available. More important is the fact that these costs represent owner-operated units of fairly well established farmers. In contrast, a large proportion of all farms are operated by tenants who lease land and buildings and use their capital for equipment and operating costs, including livestock. On this basis, a fairly large unit can be operated with a limited amount of capital. Many tenant farmers prefer such an arrangement and continue to lease although they could easily own their properties. Location during inflation is not impossible, but is likely to favor renting more than buying. Any assumed debt should be considered in relation to long-time earning capacity of the farm.

Some idea of the opportunities in farming in different regions of the country can be obtained by examining farmers' reports of their incomes and investment in 1945. Farms are grouped in

table 1 by economic classes, as determined largely by the value of what farmers sold or used in their own living. Every region has some large-scale and many very small farms in each. This is the basis for saying that there is a greater variation of opportunity within each region than there is among regions; or, perhaps, that a man with determination can pick any area of the country he likes and make a good living on the right farm in that area. However, it may be a little easier where reports show that there is a larger number of fairly prosperous farms.

Some idea of changes in net income from year to year can be gained by looking at those of farms selected from various parts of the country (table 3). These net incomes differ widely by type; but the changes from 1939 to 1946 are more significant because they show what can happen to income on just one farm. Winter-wheat farms had the greatest fluctuation in income while dairy units tended to be most stable.



Study of the information in tables 1 and 2 gives some idea of the amount of money needed to run farms of different sizes in different parts of the country. This information also indicates the limited incomes that can be expected and the difficulties to be faced if farming is started on a shoestring. These difficulties are not so much a barrier to prospective farm operators, as they are a warning that unusual care should be used in selecting the right farm. Any individual judgment should be aided by consulting all local sources of advice in respect to proper size, type of farming, location, and prospective return. In most cases, this will be necessary to obtain the loan to start farming. In any case, such consultation will be important if the prospect hopes to become a prosperous member of the farming community.

*Farm Training*

Much depends on the training the individual receives for farming. Obviously, there are excellent and poor schools, with many in between. Also, a good school may not be available in the area or for the type of farming selected. The choice of a school should be very carefully discussed by the counselor and, if crowded conditions prevent free selection, it may be desirable to do some apprentice training in the chosen area before going to school. Owing to the very general nature of the advice presented here, purchase of an actual farm before schooling is not recommended.

TABLE 1.—Number and average size of farms by economic class, United States, 1945<sup>1</sup>

Economic class	Number of farms	Average per farm <sup>2</sup>				
		Gross value of product	All land	Harvested cropland	Value of land and buildings	Value of implements and machinery
		Thousands Dollars	Acres	Acres	Dollars	Dollars
Large-scale units.....	102.1	39,203	2,905	384	78,422	6,452
Large family farms.....	408.9	10,484	514	193	26,067	3,021
Medium family farms.....	1,173.0	4,658	236	104	11,135	1,616
Small family farms.....	1,661.9	1,874	125	46	5,117	595
Small holdings.....	923.5	825	72	22	2,305	204
Part-time farms.....	602.2	574	43	10	2,585	209
Nominal units.....	987.3	264	65	11	3,583	176

<sup>1</sup> Master Sample, U. S. Census of Agriculture.  
<sup>2</sup> Average of all farms in each class.

NOTE.—This information by economic class is a convenient means of showing how investment costs vary among different sizes of business, what the more common sizes are, and the average value of product sold or consumed by the different classes.

*Type of Farm*

The use of the word “type” in the discussion of farming may be confusing. Type, in this context, denotes the major source of income. Thus, by definition, a dairy farm obtains over 40 percent of its gross income from dairy product sales and no other source approaches 40 percent. More detailed analysis would point out that very few farms receive all their income from only one source; thus, we have dairy-poultry, dairy-hog,

TABLE 2.—Number of farms and average value of land, buildings, and machinery, by economic class and by major region in the U. S., 1945<sup>1</sup>

Economic class	U. S.	North	South	West
Number of farms (in thousands)				
Large-scale units.....	102.1	41.2	25.1	35.8
Large family farms.....	408.9	263.4	76.9	68.6
Medium family farms.....	1,173.0	752.2	311.8	109.0
Small family farms.....	1,661.9	635.7	923.6	102.6
Small holdings.....	923.5	217.1	674.2	32.2
Part-time farms.....	602.2	218.4	323.1	60.7
Nominal units.....	987.3	353.4	546.2	85.7
Total.....	5,858.9	2,483.4	2,880.9	494.6
Average value of land and buildings				
Large-scale units.....	\$78,422	\$60,017	\$87,108	\$93,509
Large family farms.....	26,067	26,629	23,309	26,999
Medium family farms.....	11,135	12,191	6,347	12,509
Small family farms.....	5,117	6,608	3,791	7,813
Small holdings.....	2,305	3,293	1,921	3,690
Part-time farms.....	2,585	3,065	2,052	3,687
Nominal units.....	3,583	4,635	2,444	6,486
Average for all farms.....	8,100	10,394	4,644	16,706
Average value of implements and machinery				
Large-scale units.....	\$6,452	\$6,335	\$6,122	\$6,816
Large family farms.....	3,021	3,230	2,591	2,701
Medium family farms.....	1,616	1,698	1,014	1,383
Small family farms.....	595	912	366	685
Small holdings.....	204	357	149	317
Part-time farms.....	209	321	135	198
Nominal units.....	176	243	113	300
Average for all farms.....	899	1,350	422	1,411

<sup>1</sup> Drawn from the Master Sample of U. S. agriculture. Each economic class is defined in terms of the total value of products, with the value of land and buildings and the number of days the farm operator worked off the farm as secondary criteria. For full description see U. S. Census of Agriculture, 1945, Special Report, 1945, Sample Census of Agriculture, page 16.

corn-hog-beef cattle, cotton-peanuts, cattle-potato, and literally hundreds of similar combinations. Also, very few areas are completely dominated by one type, so that a corn-hog area has corn-hog farms neighbored by poultry and dairy. These details will become much clearer during the education of those who select farming on the basis of these statements.

In summary, farming is not an also-ran occupation. On the contrary, it is a highly skilled in-

TABLE 3.—Investment, cost, and net income of selected typical farms, 1939-46

Item	1939	1940	1941	1942	1943	1944	1945	1946
Wheat farm—Southern Plains								
Investment in:								
Land and buildings.....	\$14,125	\$13,704	\$13,872	\$14,625	\$16,520	\$19,040	\$24,000	\$26,015
Machinery and livestock.....	2,682	2,762	3,028	3,978	5,316	5,100	5,255	5,639
Return from farming:								
Total income.....	1,772	2,246	5,711	7,879	6,941	9,100	9,081	11,253
Total expense.....	1,161	1,146	1,485	1,605	1,648	1,855	1,794	1,959
Net farm income.....	611	1,100	4,226	6,274	5,293	7,245	7,287	9,294
Cash grain farm—Corn Belt								
Investment in:								
Land and buildings.....	23,914	24,173	24,365	25,021	29,868	34,960	36,424	41,360
Machinery and livestock.....	2,889	2,783	2,924	3,703	4,864	4,833	4,835	5,180
Return from farming:								
Total income.....	4,080	4,201	6,560	8,905	9,738	9,389	10,276	14,268
Total expense.....	1,428	1,446	1,709	1,971	2,186	2,463	2,326	2,458
Net farm income.....	2,652	2,755	4,851	6,934	7,552	6,926	7,950	11,810
Wheat, small grain, and livestock farm—Northern Plains								
Investment in:								
Land and buildings.....	7,192	6,703	6,734	7,184	8,022	9,187	11,876	13,082
Machinery and livestock.....	2,286	2,426	2,667	3,268	4,052	4,025	3,899	3,981
Return from farming:								
Total income.....	2,093	2,316	4,457	5,864	7,318	7,623	8,697	10,750
Total expense.....	1,005	1,084	1,303	1,466	1,752	1,830	1,805	1,872
Net farm income.....	1,088	1,232	3,154	4,398	5,566	5,793	6,892	8,878
Cotton farm—Black Prairie area, Texas								
Investment in:								
Land and buildings.....	7,370	7,480	7,535	8,060	8,945	9,940	13,442	14,872
Machinery and livestock.....	1,061	1,084	1,228	1,503	1,863	1,875	1,899	1,982
Return from farming:								
Total income.....	1,874	2,028	2,441	2,814	3,509	3,346	3,543	4,361
Total expense.....	637	777	807	933	1,103	1,312	1,346	1,457
Net farm income.....	1,237	1,251	1,634	1,881	2,406	2,034	2,197	2,904
Dairy farm—Southern Wisconsin								
Investment in:								
Land and buildings.....	9,000	9,075	8,470	9,516	10,248	11,224	12,078	12,810
Machinery and livestock.....	3,125	3,116	3,264	4,133	4,941	5,188	5,270	5,750
Return from farming:								
Total income.....	2,382	2,923	4,002	5,483	6,261	7,041	7,434	8,819
Total expense.....	1,293	1,334	1,558	1,804	2,111	2,420	2,610	2,677
Net farm income.....	1,089	1,589	2,444	3,679	4,150	4,621	4,824	6,142
Dairy farm—Central New York								
Investment in:								
Land and buildings.....	5,538	5,616	5,616	5,760	6,525	6,670	7,250	8,120
Machinery and livestock.....	3,203	3,140	3,341	3,855	4,990	5,320	5,535	5,728
Return from farming:								
Total income.....	2,794	3,299	4,041	5,298	5,796	7,133	7,386	8,028
Total expense.....	1,693	1,819	2,133	2,539	2,782	3,329	3,289	3,450
Net farm income.....	1,101	1,480	1,908	2,759	3,014	3,804	4,097	4,578
Hog and dairy farm—Corn Belt								
Investment in:								
Land and buildings.....	9,648	9,792	10,050	10,720	12,144	14,000	15,904	18,144
Machinery and livestock.....	2,963	2,856	2,895	3,721	4,732	4,779	4,734	4,998
Return from farming:								
Total income.....	2,443	2,684	4,003	5,408	5,856	5,685	7,193	8,998
Total expense.....	1,197	1,194	1,455	1,712	2,017	2,394	2,550	2,589
Net farm income.....	1,246	1,490	2,548	3,696	3,839	3,291	4,643	6,409
Hog and beef fattening farm—Corn Belt								
Investment in:								
Land and buildings.....	15,771	15,516	15,768	17,748	19,665	21,840	26,500	30,672
Machinery and livestock.....	3,844	3,630	3,971	5,091	6,974	6,908	6,851	7,351
Return from farming:								
Total income.....	3,249	3,763	5,724	8,609	8,524	8,715	9,519	13,820
Total expense.....	1,627	1,555	1,917	2,262	2,650	2,949	2,989	3,106
Net farm income.....	1,622	2,208	3,807	6,347	5,874	5,766	6,530	10,714

Source: F. M. 55, Typical Family-Operated Farms, 1930-45, by Wylie D. Goodsell, Ronald W. Jones, and Russell W. Bierman; and F. M. 68, Farm Costs and Returns, 1945 and 1946, by Ronald W. Jones.

dustry that offers as good opportunities as any in the country. It has its trade arrangements that make entry difficult in some instances, such as acreage allotments, restricted markets, established areas covered with no-sale signs and closed associations. So has every occupation. An intelligent person with adequate financing, who is willing to obtain or has already received adequate education and experience, can find excellent opportunities in agriculture.

*For Further Information*

Among the many publications of the United States Department of Agriculture, the following are especially recommended. They may be obtained free by writing to the Department, Washington 25, D. C.

Getting Started in Farming, Farmers' Bulletin No. 1961, rev. December 1945.

Farm Opportunities? Prospects, Problems, Policies, rev. September 1946.

Suggestions to Prospective Farmers and Sources of Information, February 1945.

Reports of interest to the prospective farmer also may be obtained from State departments of agriculture and agricultural experiment stations. One publication especially recommended is the following:

Capital Needed To Farm in the Midwest, University of Minnesota Agricultural Experiment Station, North Central Regional Publication No. 5. Reprinted August 1947. May be obtained from the United States Department of Agriculture.

NOTE

The following descriptions give a few of the variations in farming by types and regions. For each is presented a general description of relative opportunities. The field of farming as an occupation is barely opened up. In the selection of any farm, the need for sound local advice cannot be overemphasized. This need also exists for those planning farm-service jobs on a custom basis. Particularly should advice be sought from agricultural colleges, county agents, successful farmers, and farm associations.

## NORTHEAST STATES

### Northeast States—Dairy Farms

Dairying is by far the most important type of farming in the Northeast. The degree of specialization, the size, the productivity, the location with regard to market, and other factors all affect the income possibilities of the farm. Dairying is often combined with poultry or cash crops, and many so-called general farms could better be called diversified dairy farms.

Most Northeast dairy farms produce their own roughage (hay, silage, pasture, etc.), but very few produce all of their feed concentrates. The proportion of concentrates produced varies widely

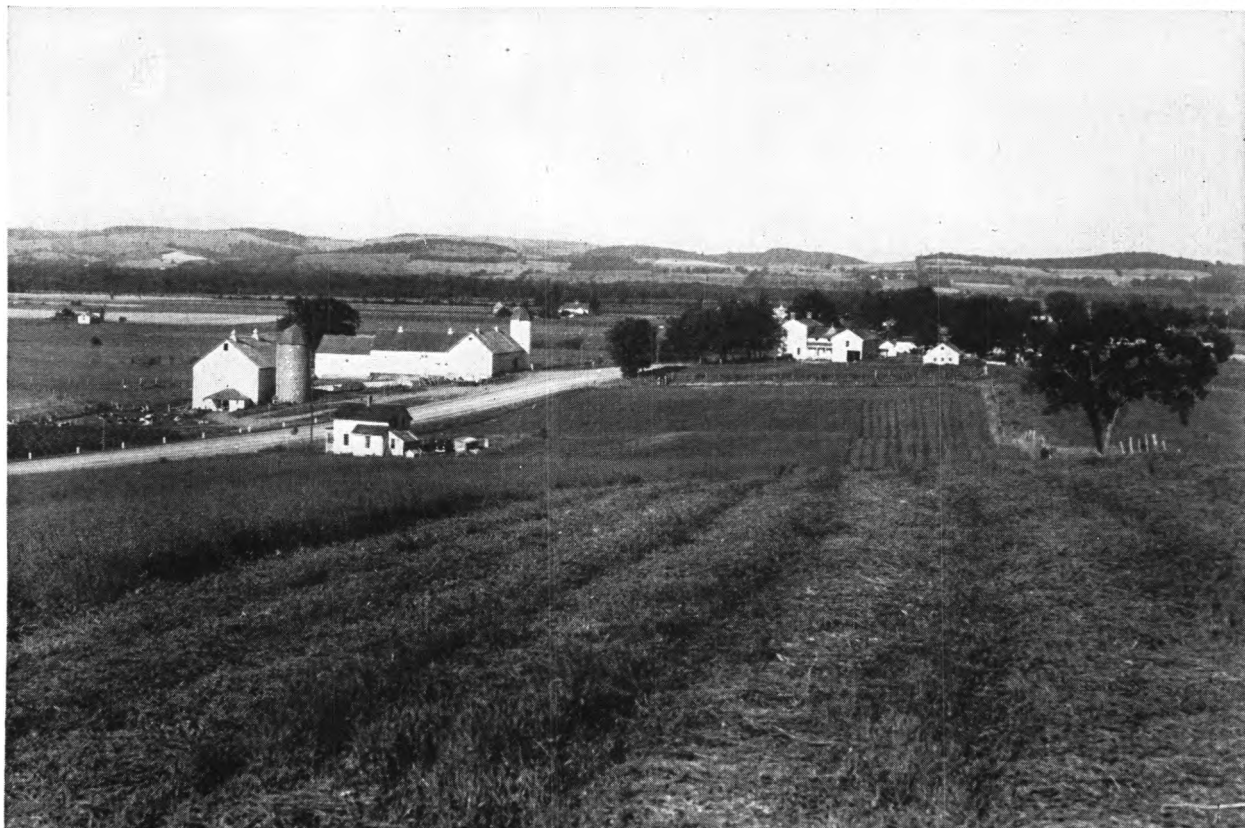
between areas and between farms, but Northeast dairymen generally have found that it pays to keep enough cows to utilize fully the labor supply and roughage capacity of their farms, even if this means purchasing all the concentrates.

#### *The Job*

A dairy farmer with a herd of suitable size has productive full-time employment for himself and family. Some seasonal help may be needed for haying and other harvesting. Feeding, milking, and other chores must be done every day and at

A dairy farm in the Northeast where sturdy buildings and cows which give high yields of milk are typical.

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fairly definite hours. This means that the operator and his family are tied down more than in some other types of farming.

Mechanical aptitude is necessary because a milking machine, farm truck, tractor, mower, rake, sprayer, and other field equipment must be kept in operating condition, and buildings kept in repair. An understanding of livestock characteristics and disease control is essential.

### *Outlook*

There is every indication that dairy farming will continue as the most important type in this region. It is more stable than most other types, ties in well with conservation programs, provides good distribution of employment and income during the year, and has a favorable long-time outlook.

## Northeast States—Fruit and Berry Farms

This is a risky and difficult business as a commercial enterprise. A typical Northeast family fruit farm would have from 40 to 100 acres, with from 60 to 95 percent planted in fruit trees. Not all acreage will be of bearing age, as rotation to maintain production is necessary. Commercial tree-fruit farms are concentrated in areas where soil and air drainage have proved favorable, such as the lower Hudson Valley of New York, central Massachusetts, south-central Pennsylvania, the lake areas of western New York, and parts of New Jersey.

Apples, peaches, cherries, grapes, cranberries, blueberries, strawberries, and raspberries are among the fruits grown commercially in the Northeast. Acreage of berry farms is smaller than for fruits grown on trees, and work is much more intensive. Favorable areas for grapes are concentrated along the lakes in New York; for cranberries, in the Massachusetts and New Jersey bogs; for blueberries, the rolling land of New England, particularly Maine; for other small fruits, somewhat wide possibilities. Many of these farms also grow vegetables or have a dairy or poultry enterprise. Also, many dairy and poultry farms have a minor fruit enterprise.

### *The Job*

Skill and experience are required to bring somewhat delicate crops through the year. Disease and weather must be constantly battled. Harvest and marketing must be timed to maximize returns. Fruit growers are less tied down to the farm, except for spraying and harvesting, than are other farmers, but the work is hard and good supervisory ability is essential. Daily work requires considerable mechanical aptitude for equipment used and good judgment in timing seasonal operations. Bad investments are exceedingly dangerous in tree-fruit farms, because the cycle of growth covers such a long time and there is such wide variation in farm productivity. Because of soil and topographical limits in the Northeast, the purchase should be most cautiously made.

### *Outlook*

Especially favorable areas offer good opportunities for the well-grounded, well-financed operator. Outside of these areas, many unfavorable production and marketing conditions are likely to force continuation of recent declines in commercial fruit farming.

*See Part-Time and Resort Farms, pp. 386, 387.*

## Northeast States—Poultry Farms

Unusually risky business for inexperienced operators. A fairly typical general poultry farm raises about 2,500 sexed to 5,000 mixed chicks and keeps 1,500–2,500 laying hens on a small acreage. Few, if any, crops are grown. There are countless variations of this scheme. Perhaps the most profitable with a small investment, although it demands high skills, is the keeping of fewer birds and doing door-to-door selling of chickens and eggs. A higher price for eggs can also be obtained by selling them to hatcheries. Some egg producers buy full-grown pullets and concentrate on egg production only. In the late thirties, commercial broiler production became very popular. Broiler (young chickens for meat) production is fairly simple, except for disease problems, and can be profitable. However, a careful study of possible markets should precede any investment in broiler production. Poultry is often one of several enterprises on diversified farms.

Many substantial poultry farmers have cows, field crops, and some fruits or vegetables. This adds to work and total investment, particularly in land, but it allows diversification as a protection against bad years in the poultry enterprise and, also, increases products received from the farm by the family. Small flocks are common on part-time farms and as backyard flocks in suburban or town areas.

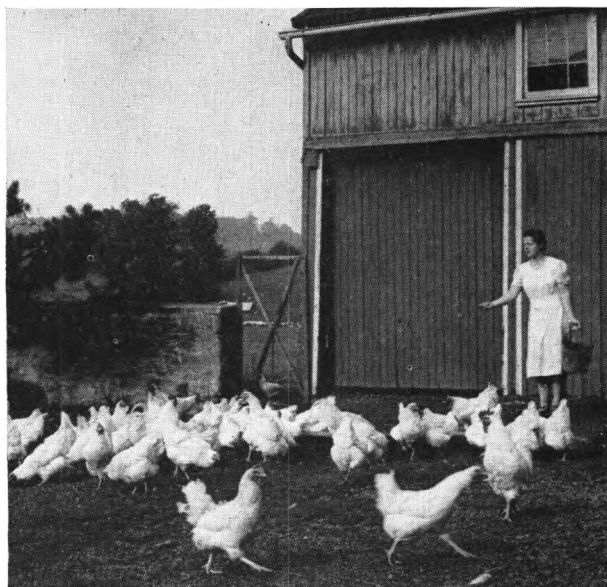
### *The Job*

The work is more specialized than dairy or general farming. As in most farming, certain chores, such as picking up and delivering eggs, feeding, watering, and cleaning, must be done every day. Seasonally, houses must be cleaned and repaired and birds prepared for market. Some of this is hard physically, and it is monotonous. Mechanical aptitude is not so important as on farms with much field work, but good management and planning are.

Cleanliness is unusually important in poultry farming. High mortality can very quickly wipe out a year's profits. Among the best protections

against disease are cleanliness, knowledge of diseases and their remedies, and establishment of disease-free stock.

Poultry farming has less seasonal or exceedingly heavy work than many other farm enterprises. The operator and his family can and should plan to do practically all their own work.



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The farm flock of chickens brings food to the table and adds considerably to money earned by the farm family. Small flocks are common to all parts of the country. Larger commercial poultry farms also are found in most parts of the United States.

### *Outlook*

Dense population of the Northeast requires large quantities of poultry products. Poultry farming is well suited and highly important to the agriculture of the area, but competition is exceedingly stiff. Ease of production and shipping from surplus feed-producing areas, short-time and relatively small investment required to establish poultry enterprises, and disease dangers inherent in poultry make it a somewhat risky farm venture. Efficient, well-located, well-financed poultrymen do have a place, but this is a type of farming in which investments should be made with caution, particularly so in broiler production.

*Other Types*

Poultry includes chickens, turkeys, ducks, geese, guineas, and pigeons. Variations in invest-

ment, marketing, and care occur among these fowl, but the comments above apply to all.

*See Part-Time and Resort Farms, pp. 386, 387.*

## Northeast States—Tobacco Farms

Tobacco may be grown alone, but some farms combine it with other crops and livestock. Areas are very limited and little tobacco is now grown outside the Connecticut Valley and the Lancaster-York district of Pennsylvania. Farms for family operation vary from 25 to 200 acres; the smaller units all in crops, mostly tobacco, the larger with considerable livestock. Good tobacco land is expensive, and high investment is necessary, largely in land but also in equipment. In some parts of the Connecticut Valley, a few acres of tobacco are combined with onions, potatoes, poultry, and truck crops. In Pennsylvania, tobacco is one enterprise on farms growing truck crops and field crops for a dairy enterprise.

Both areas grow cigar tobacco; valley types for wrappers and binders and Pennsylvania for filler. Some valley acreage is shade-grown, a type for which marketing is very closely controlled. All is grown under a Federal allotment program, and the farm's allotment history should be considered before purchase is made.

*The Job*

Tobacco culture is difficult and risky. It should not be undertaken without some experience and education. Income from an acre of tobacco is unusually large. So is amount of toil per acre. Work is hard, quite seasonal and demands skill and knowledge of a special kind. Combination of enterprises in which tobacco is usually found includes dairy, poultry, and truck crops. Work and management on such farms require a vigorous, resourceful operator with mechanical aptitude and experience in planning and carrying out field operations of considerable complexity.

*Outlook*

The cigar-tobacco enterprise has decreased considerably in the past 20 years. It is very doubtful that this trend will change, although it was reversed somewhat by World War II. As part of a combined farm operation, tobacco will continue to be grown on land suited for it. Purchase of farms at prices built up from tobacco land only should be made with extreme caution, particularly at present levels.

## Northeast States—Vegetable Farms

A difficult business with a premium on successful marketing and handling of labor; high cash expenses, and much tedious work. A fairly common vegetable farm has about 30 acres of cropland devoted to crops such as carrots, peas, lettuce, spinach, beets, cauliflower, cabbage, radishes, squash, and celery. Kinds of vegetables raised and number of replantings of the same land depend on the market, available labor, soil, and the operator. In some areas, potatoes are the major or only crop.

Market-garden operators sell from roadside stands, to stores, and to wholesale producemen. Market gardening is characterized by large proportion of retail sales and wide variety of crops. Intensity of operation is dictated by high value of land, usually situated in or near a large city. Many cities still have farmers operating small acreages and running huckster routes.

Operators of larger acreages farther from the cities may concentrate on fewer varieties and quality produce, selling in several cities and through

outlets such as chain stores that take full loads. Soil types also may limit the vegetables grown and the advisability of intensive production. Some areas are particularly well adapted to certain crops, sold both for fresh market and for processing. Typical of these specialties are the peas, beans, and sweet corn of New Jersey and the cabbage area of northern New York. Among specialized potato areas, Aroostook County, Maine, is outstanding. Long Island, N. Y., also has many potato farms.

### *The Job*

Vegetable production is concentrated in the summer months and requires long hours of hard physical work in the field, in the packing house, and in the street or market. Modern machinery eases some of this work. The family works, but the operator must also be a good hirer and supervisor of seasonal help, mostly "stoop" laborers.

Planning lay-out for the year, to prevent impossible seasonal labor peaks at harvest and to maximize returns by "hitting the market," pays high dividends. Picking at the right time or, occasionally, plowing a crop under and replanting require good judgment and managing ability.

### *Outlook*

Dense population of the Northeast offers many opportunities for well-financed, intelligently operated, and purchased market gardens. Vegetable growing for processing or distant shipment also is advantageous in those regions of good soils and topography that favor vegetables, particularly the muck areas. While processing may expand more rapidly in other regions, the Northeast will at least hold its established acreage which is devoted to this purpose.

See *Part-Time and Resort Farms*, pp. 386, 387.

## Northeast States—Resort Farms

A sound way of making the best of some bad farm locations. Resort farms can produce income ranging from hundreds of dollars to several thousands on a correspondingly wide range of investment. Ideal resort locations are fairly numerous and may even be good farms of more common types, usually dairy or general. Success depends on farming ability, plus the knack of promotion and meeting the public.

Primary factor for success is location. Recreational opportunities for winter and summer sports, such as swimming, hiking, skiing, golf, or just resting, are essential. Cabin or house sleeping accommodations and a large dining room must be furnished. On the farm side, as much food as possible must be home-grown; on most successful resort farms (as distinguished from resorts), reputation depends on production and good home cooking of farm food.

They vary from small shore poultry farms to hilly general farms having rambling homes in the mountains. Upland dairy farms, whose meadows lead to steeply pitched hills and mountains, are excellently located for resort farming. Some

farmers act as caretakers for cabins, summer homes, or residential estates, and sell products seasonally to the owners.

### *The Job*

The resort farm is a logical extension of the summer-boarder enterprise, which has long been common in the Northeast. As such, its success depends more on the farm wife and her kitchen than on the husband's barns and crops, because she meets the guests more often and, in the summer especially, he is busy on farm chores.

Aside from guest attention, the job calls for farming skills to fit the type. For example, dairy work on a resort farm is just as hard and demanding as on a dairy farm, and the operator should have learned his trade before he started.

Resort farms are more likely to be in poorer agricultural areas where farming as such is a part-time occupation, and guest time is supplemental work for the farmer. However, the operator should have a garden, poultry, dairy, and other small enterprises that will interest his guests and, also, reduce the cash costs of keeping them. These



varied enterprises will tax his ingenuity and, occasionally, his physical strength.

#### *Outlook*

While not a commodity type, this kind of farm was steadily increasing in number before the war and will further increase as the large population exploits recreational advantages of shorter work-

weeks. Ideal locations (mountain, shore, lake, river) and good management can be combined to make this a fairly stable kind of farming. Competition from roadside and "airside" cabins and highly commercialized resorts will remain strong. The greatest present draw-back is the seasonality of such trade, limiting the profit to a few weeks in summer.

## Northeast States—Part-Time Farms

Very common and usually quite successful. They usually have from 3 to 100 acres with a garden, small pasture, a cow and pig or two, and a small flock of chickens. None of them offer either large cash results or the often advertised "5-acres-and-independence." Variations in part-time farming usually reflect resources of the farm and work schedule of the operator and his family. In contrast to the residential farm, these produce for sale and aim for some net cash farm income.

#### *The Job*

Fairly light work of a wide variety is customary on a part-time unit. Some of this is burdensome

on the operator, even though his main work is off the farm. His purpose is to add to his real income by well-directed use of spare time.

#### *Outlook*

More part-time units will develop as workweeks are reduced, as submarginal farms fail as commercial units, as farmers get part-time jobs off the farm, as pensioners find suitable locations, and as urban people indulge their back-to-the-farm urge. Families which buy within the limits of their resources and operate within their physical and financial limitations will be successful.

## CORN BELT STATES

### Corn Belt States—Corn-Livestock Farms

This type includes many of the best farms in the country. The livestock enterprises combined with corn and other feed grains include the hogs, hogs-dairy, hogs-beef fattening, and hogs-beef raising. Acreage ranges from 60 to 440 with the more common size from 135 to 320 acres depending on type of operation. The corn-hog unit is typical but not exclusively so, of any large area. Actually, it is a general term used to describe the Corn Belt where corn is a highly important crop and hogs are the major vehicle for selling the corn.

The combination of hogs and dairy cattle is found in areas having good corn-small grain land and also land whose soil and topography favor hay and pasture. It is most common in northeastern Iowa and Indiana and northwestern Illinois and Ohio. Oats, wheat, barley, and soybeans are found to some extent on these farms. Major source of income lies in 10 to 15 cows and sales of around 12,000 pounds of hogs.

Hog-beef fattening combinations are favored by operators with considerable corn and some roughage which they think can be sold best through raising hogs and some cattle and fattening both. In addition, they buy feeder cattle for fattening and often purchase additional grain for this fattening. Areas prominent in this type are in western and east central Iowa, in north-west-central Illinois and in northwestern Missouri.

Hog-beef raising operators, on the other hand, place less emphasis on fattening their own cattle; they sell some stocker and feeder cattle, milk a few cows and are much like general farmers in their diversity. Ordinarily, these farms are not large in either acreage or volume of business and are typical in northeastern Missouri and the Iowa and Illinois areas adjacent to it, and southeastern Ohio.

#### *The Job*

Corn-livestock operators must have a high degree of skill in the handling of animals and in field work. Long, hard days are common, except for a few weeks in late winter. Versatility is essential, and supervisory ability is very helpful at peak labor seasons. Experience, adequate capital, and good marketing sense have important effects on income.

#### *Outlook*

These farms are in our major farming region, and prospects are bright. Adequately sized, well financed, and well-operated units in this group have as good a future as farms anywhere else in the country.

### Corn Belt States—Cash Grain Farms

These units are among the largest in acreage in the Corn Belt. They are most common in west north central Iowa and in east central Illinois. Corn, soybeans, and oats are their major crops; hogs and beef cattle their major livestock. Their operators, compared with livestock farmers, usually plan to sell a larger share of their grains and to market somewhat less grain through livestock. They have increased their acreages of soybeans faster than most other farmers in the region and now have 10 to 35 percent of their cropland

in beans. Mechanical harvesting and favorable soils have favored this development.

#### *The Job*

Cash grains require large amounts of labor during the growing seasons. Much of the work is done by the operator and his family. It is very desirable that the operator have good knowledge and working experience in field crops. Planting, growing, and harvesting are highly mechanized,

and equipment use and care are very important. But some labor must be hired and supervised.

#### *Outlook*

The productivity of these units and the need for

feed to meet expected national increases in livestock products denote a bright future. Recent trends toward more livestock and more soybeans than before the war, probably will continue.



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Combining soybeans in the Midwest. This type of harvester, originally developed for large-scale wheat farming, is now used on many other crops.

## Corn Belt States—Dairy Farms

This is an important dairy region. Commercial dairy farms are found around all urban areas. In addition, there are numerous areas where roughage-consuming livestock and feed-grain production give operators their best income; in many cases, where this is true, dairy becomes the best livestock enterprise. Among these are northeast-

ern Iowa, southwestern Missouri, parts of northern Indiana, northern Illinois, and much of eastern and southern Ohio. Variations in soil and topography are great enough to make any generalization about the location of "dairy" areas hazardous; thus, in most of the above areas hogs, poultry, small grain, or other enterprises are also of major

importance on many farms. Also, some dairy farms will be found in all parts of this region.

### *The Job*

Requires an active, resourceful man who can do a variety of jobs with considerable skill and, also, paper and book work necessary for good farm planning. Mechanical aptitude is necessary because a milking machine, farm truck, tractor, mower, rake, and other field equipment must be kept in operating condition and buildings kept in

repair. An understanding of livestock characteristics is essential.

### *Outlook*

Good opportunities in this region. In the well-established areas, much of the land is well suited to dairy farming and developed markets are available, although better markets are needed particularly in the sour-cream areas. Experienced operators on the better dairy farms can find profitable year-round employment with less fluctuation of income than on more specialized farms.

## Corn Belt States—Fruit and Vegetable Farms

Not primarily a fruit or vegetable region, although considerable quantities of both are grown in certain areas.

Various fruits are widely but sparsely grown. Commercial units are limited by better alternatives. They are located mostly in southwestern, east central, and other hill areas of Missouri; southern Illinois, south central Indiana; northeastern and, to some extent, eastern Ohio. Apples are the largest enterprise, but peaches, cherries, and berry crops are heavy contributions to commercial fruit production.

Fruit farms are concentrated around urban districts in the northern areas of States bordering on the Great Lakes, and in a few areas where one or two crops are heavily grown. Sweet corn and canning peas are widely grown as one enterprise on general or livestock farms, although peas are heavily concentrated in northern Illinois; melons are centered around St. Louis and in the bootheel of Missouri, in southwestern Indiana, and at the western end of Lake Erie; tomatoes in Indiana and northwestern Ohio. Many other vegetables are grown commercially in the northern areas of Ohio, Indiana, and Illinois, and in alluvial soils particularly along the Wabash, Illinois, and Mississippi Rivers.

Large centers of population in this region have resulted in a considerable number of market garden units, similar to those in the Northeast. These are typified by small acreages and intensive production on suburban land.

### *The Job*

Production is concentrated in the summer months and requires long hours of hard physical work in the field, in the packing house, and in the street or market. Operators must also be good hirers and supervisors of seasonal help, mostly "stoop" laborers. Planning lay-out for the year, to prevent unmanageable seasonal labor peaks at harvest and to maximize returns by "hitting the market," pays high dividends.

The job requires skill and experience to bring somewhat delicate crops through the year. Disease and weather must be constantly battled. Fruit growers are somewhat less tied down, except at harvest time, than are other farmers. Danger of bad investments is exceedingly great, because the cycle of growth of tree fruits covers such a long period.

### *Outlook*

Good opportunities in market gardening for energetic operators. The remainder of commercial vegetable farming on a family scale does not offer very good prospects, other than a living to the small operator. New processing and production methods favor continued increases in units larger and more expensive than those discussed here. Fruit farms are not likely to increase, and competition for land in the few favored areas is likely to require heavier investments than long-time market prospects can justify.

## Corn Belt States—Poultry Farms

Although this is the largest poultry producing region, there are relatively few commercial poultry farms. The large production of this region comes from 50–300 hen flocks which are found on nearly all farms. Either as scavengers or as well-fed family flocks, these hens add to family living and farm cash income. On many farms, turkeys are raised in the same minor enterprise manner.

Commercial poultry farms have increased in number in the past 30 years. Operators of farms that are too small for successful grain-livestock farming often have found poultry a profitable major enterprise. A commercial unit houses from 1,000 to 2,000 laying hens, selling cockerels and culls for meat. Broilers, sold for meat at 3 to 5 months, are raised in annual units of from 10,000 to 25,000. Turkeys are sold for meat at 5 to 7 months, usually in the fall, from flocks of 500 to 5,000.

### *The Job*

Work is more specialized than dairy or general farming. Certain chores, such as picking up and

delivering eggs, feeding, watering, and cleaning, must be done every day. Seasonally, houses must be disinfected, repairs made, and birds marketed. Mechanical aptitude is not so important as on farms with much field work, but good management and planning are.

Control of disease is unusually important in poultry farming. High mortality can very quickly wipe out a year's profits. Among the best protections against disease are cleanliness, knowledge of diseases and their remedies, and establishment of disease-free stock.

### *Outlook*

This area, compared with prewar, should be good for increases in commercial poultry production. Poultrymen are in feed-grain areas and usually can grow much of their own feed or buy easily. Also, large urban populations offer good local markets, as low-cost poultry meat has a definite place in the protein diets of our steadily increasing population. Probable increases in breeding and hatching for sale in the region offer profitable investment for operators skilled in this work.

## Corn Belt States—General Farms

General farms include a few of the best and many of the average to poorer farms in this region. Their income is from a wide variety of crops and livestock with no outstanding contributor. Some general farms are found all over the region, but they are most numerous in Missouri, west-central and southern Illinois, northeastern and southern Indiana, northwestern and southeastern Ohio. Most general farmers use fairly level land for feed and cash crops, rolling land for hay, and rough land for pasture and woods.

Among enterprises found on general farms are dairy, poultry, cattle, hogs, sheep, feed grains, wheat, potatoes, fruit, vegetables, and forest products. The actual combination is determined by

the resources, available markets, and the operator. They are relatively small in both acreage and cash receipts. The smaller units are likely to be self-sufficing with little commercial production.

### *The Job*

Operators must be vigorous, resourceful, well-trained and skilled in management. A wide variety of jobs must be well done or well supervised. Some knowledge of production methods and operating problems, such as disease control in cattle, hogs, sheep, vegetables, and field crops is necessary. General farms offer good opportunities to plan operations to get the most from family labor.

*Outlook*

Good opportunity for profitable farm operations, on a smaller scale and with less investment than other types in this region. The better located units offer an adequate living to the operator and

his family. Planned to give employment all year and to take advantage of soil and climatic resources, these farms, if well managed, should be successful. Year-to-year variations in income are exceptionally small compared with other types, although income average is lower.

## Corn Belt States—Part-Time Farms

Part-time units are common around urban areas which have much seasonal work. They have from 1 to 20 acres with a garden, small pasture, a cow and pig or two, small flock of chickens and maybe a few fruit trees. None of this offers large cash returns nor the often advertised "5-acres-and-independence."

Variations usually reflect soil resources of the farm and the whims of the operator. Some dislike livestock and have none. Some have seasonal jobs, which allow time for a small market garden. Others have large units, with poor soil, and several dairy cows that are pastured on the farm, but which must be fed on feed and hay brought from the outside. In southern areas of Illinois, Ohio, and Missouri especially, there are numerous hilly areas where part-time units have developed, although off-farm employment is very irregular.

*The Job*

Fairly light work of a wide variety is customary.

None of this is too demanding on the operator, whose main purpose is to add to his income by well-directed use of spare time. Perhaps the greatest asset is the lower cost of living that comes from substituting rural for urban modes of living.

*Outlook*

More such units can be expected as workweeks are reduced, submarginal farms fail as commercial units, pensioners find suitable locations, and urban people indulge their back-to-the-farm urge. Successful ones will be operated by families which buy within the limits of their resources and operate within the limits of their ability, both physical and financial. Number of markets in this area tend to make it a good prospect for commercial part-time operation. Cow-chicken-hog-garden units for family use only will continue to be numerous as enterprising families try to stretch meager off-farm incomes to meet family needs.

# LAKE STATES

## Lake States—Dairy Farms

This is one of the principal dairy regions of the country. Soils, climate, topography, and experience in dairying in this region are a combination that has made it one of the greatest dairy areas in the world. In size, farms vary from 60 to several hundred acres. Products vary from fluid milk to rare cheese.

They are in all areas of this region, but are centered in the southern half of Wisconsin and Michigan and in southeastern Minnesota. In southwestern Minnesota and, also, along the southern border of the region, farming tends more toward Corn Belt agriculture with emphasis on corn-oats-livestock. While incomes are much lower in the northern areas, dairying still is the most important source of revenue. It is accompanied by hay, pasture, and sometimes small grains. Potatoes, cabbage, rutabagas, and cucumbers are common cash crops.

Fluid milk marketing and specialization in milk production is typical of areas adjacent to urban markets, particularly around Chicago, Detroit, Twin Cities, and other large centers, which are most numerous in the southern half of the region. Milk in excess of fluid needs goes into evaporated and dried milk, butter, cheese, and other manufactured products. Some areas also ship large quantities of cream to other regions.

Farms range upward from one-man units of 10 to 20 cows on 80 to 120 acres, with larger herds on the larger farms. Nearly all, except the highly specialized fluid-milk units, have additional enterprises that vary in kind and importance with lay of the land. These include hogs, beef, cattle, sheep, poultry, potatoes, fruit, and vegetables. Soil, climate, and market determine the most effective combination.

### *The Job*

An active, resourceful man who can do a variety of jobs with at least average skill is required. Mechanical aptitude is necessary because a milking machine, farm truck, tractor, mower, sprayer, and other field equipment must be kept in operating condition, and buildings kept in repair. An understanding of livestock is essential.

### *Outlook*

Excellent opportunities in this region, as much of the land is well suited to dairy-farm needs and developed markets are available, although better markets are needed in sour-cream areas. Experienced operators can find profitable year-round employment with good prospects.

## Lake States—Crop Specialty Farms

Specialties in this region include potatoes, sugar beets, beans, and tobacco. Potatoes are the most widely grown of crop specialties, for they are well adapted to the cool climate of this region. Although grown to some extent in all areas, they are of major importance only in a few counties; the Red River Valley of Minnesota, the sandy lands of central Wisconsin, and the central-Thumb and northwestern quarter of the lower peninsula of Michigan. Acreages vary widely, but from 75 to 125 acres are needed as an adequate unit in most areas. A few growers use overhead irrigation. Field crops and livestock enterprises are of con-

siderable importance on most potato farms, even in the heavy potato areas.

Sugar beets and beans are not widely grown. The former are concentrated around Saginaw Bay in Michigan, in eastern Wisconsin, and the Red River Valley, and south-central Minnesota. In the Saginaw Valley and the Thumb, beans and sugar beets are grown on farms that are quite specialized in their production. Beans are rarely grown outside this area.

Tobacco is a minor crop. A few counties in southern Wisconsin and a few farms in southern

Minnesota have tobacco as an enterprise in areas that are primarily grain-livestock.

#### *The Job*

Crop specialty farms have their own requirements for equipment and production skills. Hard work in the fields is necessary during the growing season and it must be skillfully performed because of the price-for-quality nature of the crops.

#### *Outlook*

This region has considerable land that is well suited to potatoes and sugar beets. Beans are much more limited in area and probably will be considerably reduced in acreage during the reconversion period. This is not a major tobacco area. Also, both tobacco and sugar beets have been allotment crops and cannot be freely produced.

## Lake States—Fruit Farms

In only a few areas of the region are found the fruit farms, which range from 20 to 120 acres. With the exception of apples, which are fairly widely grown in home orchards in the southern half of the region, fruit farming is largely concentrated in Berrien and Kent Counties of Michigan. Fruit farms are also quite common along the western lake strip of southern Michigan. Cranberries are limited to the peat bogs of central Wisconsin. Raspberries are found in the Michigan areas and around the Twin Cities of Minnesota. Cherries are centered in the northern part of the Michigan lake strip and in Door County, Wis. Strawberries, pears, peaches, grapes, and dewberries are heavily concentrated in and near Berrien County, Mich.

In spite of heavy fruit production, most of these areas have feed grain and livestock of all kinds. Substantial acreages of fruit are grown by farmers who spend the majority of their time on field crops and livestock. This is particularly true of units having 80 or more acres.

#### *The Job*

A high degree of skill and experience is required to bring somewhat delicate crops through the year.

Disease and weather must be constantly battled. Harvest and marketing must be timed to maximum returns. Fruit growers are less tied down, except in harvest, than are other farmers, but their work is quite hard, sometimes disagreeable, and good supervisory ability is essential. Daily work requires considerable mechanical aptitude for equipment used and, also, good judgment in timing seasonal operations. Danger of bad investments is exceedingly great, because the cycle of growth covers such a long time. Due to this danger and because of soil and topographical limits of fruit farming, purchase should be most cautiously made.

#### *Outlook*

Good opportunities, in areas having favorable soil and climate, for well-grounded, well-financed operators. Outside of the better areas, production and marketing situations are likely to force continual declines in fruit enterprises. Extremely limited production areas in this region make establishment of new farms or purchase of old ones quite difficult and expensive.

## Lake States—Livestock Cash Grain Farms

Fairly common type in some parts of this region. Units range from 80 to 400 acres depending on the area and kind of farming. Corn, wheat, oats, barley, flax, and potatoes are the most common crops. Hogs, beef and dairy cattle, sheep, and poultry are the livestock. In southern areas,

most grain is marketed through livestock, especially hogs and beef cattle in southwestern Minnesota. Farther north, corn is usually for silage, more wheat and barley are grown, and more small grain is sold.

In the grain-corn southern areas, intensive live-



stock-grain units of from 80 to 160 acres are quite common, but at least 160 acres should be operated to obtain an adequate income. Usual combinations with grains include hogs, dairy-hogs, hogs-beef raising, and hogs-beef fattening. These units are extremely flexible and can shift their enterprises within a year or two. New soybean varieties have in recent years become part of these organizations.

#### *The Job*

Livestock-cash grain farms require a high degree of management skill and year-round work.

Mechanical skills are necessary for operating combines, tractors, and a variety of field equipment. Knowledge of livestock management is essential.

#### *Outlook*

A well-bought unit of this type offers good opportunity to an industrious, intelligent, and thoroughly trained operator for profitable employment. Continued increases in demand for meat and other livestock products are expected, and units of this type are an essential part of the meat production picture.

## Lake States—Poultry Farms

Units on which poultry is a major enterprise are not numerous but have steadily increased in recent years so that a substantial amount of commercial poultry is now produced in this region. From 1,500 to 2,500 laying hens are housed each fall, and cockerels and culls are marketed for meat. Broiler farms concentrate on meat rather than on egg production, selling somewhat heavily fed young birds at 3 to 5 months. One family can handle up to 25,000 broilers. Turkeys in flocks of 200 and up are raised for meat. They are kept longer (about 5 to 7 months) and have a shorter marketing season than broilers. Hatcheries are intensively commercial, require higher skills, and are far less common.

In this region, the majority of poultry products comes from farms of from 60 to 280 acres. These flocks have from 50 to 300 laying hens or about the same number of turkeys, and are definitely minor enterprises although they contribute a significant proportion of the farm cash income. Commercial poultry is most common in the southern areas, particularly around large cities with well-established poultry markets.

#### *The Job*

The work is more specialized and less heavy than dairy or general farming. As in most farming, certain chores, such as picking up and delivering eggs, feeding, watering, and cleaning, must be done every day. Seasonally, houses must be disinfected, repairs made, and birds marketed. Mechanical aptitude is not so important as on farms with much field work, but good management and planning are.

Control of disease is unusually important in poultry farming, as high mortality can very quickly wipe out a year's profits. Among the best protections against disease are cleanliness, knowledge of diseases and their remedies, and establishment of disease-free stock.

#### *Outlook*

This area, with markets in the heavily populated urban localities of the Midwest and Northeast, offers good opportunities to efficient, well-located poultrymen. Broiler production may expand. Poultrymen who grow much of their feed and have other farm enterprises are in a good competitive position.

## Lake States—Vegetable Farms

Commercial units are limited to a small portion of this region. There are both market garden and wholesale vegetable farms scattered through southern Michigan and southeastern Wisconsin and Minnesota. However, a majority of vegetables, particularly canning peas, are grown in combination with livestock and, in Michigan, with fruit.

Commercial units range from 40 to 120 acres and have wide annual fluctuations in income. Short growing seasons are characteristic. Canning peas and sweet corn are heavily produced in the vegetable areas, usually as a supplementary cash crop on livestock farms of Wisconsin and Minnesota. Cucumber pickles are raised in central and southern Michigan. Celery is definitely concentrated in the muck areas of southwestern Michigan, onions in the southern muck areas. Nearly all truck crops are grown commercially to some extent.

### *The Job*

Vegetable production is concentrated in the summer months and requires long hours of hard

physical work in the field, in the packing house, and in the street or market. The family works, and the operator must also be a good hirer and supervisor of seasonal help, mostly "stoop" laborers. Planning lay-out for the year to prevent impossible seasonal labor peaks at harvest and to maximize returns by "hitting the market," pays high dividends. Picking at the right time or, occasionally, plowing a crop under and replanting, require good judgment and managing ability.

### *Outlook*

Skillfully managed market gardens offer good opportunities for energetic operators. The remainder of vegetable farming on a commercial scale does not extend very good prospects and is more likely to remain as another important cash enterprise on livestock and general farms. New processing and production methods favor continued increases in units larger and more expensive than those discussed here.

## Lake States—General Farms

The better general farms of from 160 to 320 acres are found in the southern areas of the region, the Saginaw Valley of Michigan and the Red River Valley of Minnesota. Ordinarily, they reflect the farmers' attempts to maximize income by utilizing all resources available to his farm.

Income is received from some combination of cash grain, beans, sugar beets, potatoes, vegetable, dairy, beef cattle, hogs, sheep, and poultry. No one source of income is continuously dominant. Southern areas have productive prairie soils and, therefore, can ripen corn more easily. Corn-hog-beef cash-crop units are common in these areas. Farther north, less productive soils and shorter growing seasons tend to limit the number of cash crops, to increase acreages of small grains and hay, to force production of corn for silage rather

than grain, and to encourage roughage-consuming rather than grain-consuming livestock.

The poorer general farms produce a little of several products and suffer from having no production advantages. These are found most often in the sandy and cut-over areas, where poor soils and low cash receipts are prevalent.

### *The Job*

Operators must be vigorous, resourceful, well-trained and skilled in management. A wide variety of jobs must be well done or well supervised. Knowledge of production methods and operating problems, such as disease control in cattle, poultry, sheep, fruit, vegetables, and fields crops, is necessary. General farms often offer good opportunities for realizing the most from family labor.

*Outlook*

If planned to give full employment all year and to take advantage of their resources, these farms

should be successful, but at a relatively lower level compared with more specialized units. Year-to-year variations in income are small compared with other types.

## Lake States—Part-Time Farms

In the cut-over areas, many farms are part-time in the sense that they do not offer full employment to the operator. They are found most frequently in the suburban and northern areas of this region and are scattered around manufacturing districts, particularly in the southeastern area. Southern units are largely residential and have very small off-farm sales.

The usual part-time farm has from 3 to 50 acres with garden, small pasture, a cow and pig or two, a small flock of chickens, and a few fruit trees. None of this offers large cash rewards or the often advertised "5-acres-and-independence." Whenever lay-out calls for full-time work by the operator and family or large cash expenses, the farm is no longer part-time. Increase in size of business, off-farm employment, or purchase by people with outside income seems the likely result, if these units are to remain in production.

*The Job*

Fairly light work of a wide variety is customary. None of this is too demanding on the opera-

tor, whose main purpose is to add to his income by well-directed use of spare time. The operator and his family must be willing to accept the manner of living associated with part-time units: outside work, few luxuries, slower living.

*Outlook*

An increase in number may be expected as work-weeks are shortened, submarginal farms fail as commercial units, pensioners find suitable locations, and urban people indulge their back-to-the-farm urge. Units operated by families which buy within their resources and operate within the limits of their physical and financial ability will be successful. Cow-chicken-hog-garden units for family use only, will continue to be numerous as enterprising families try to stretch meager incomes to meet family needs. In addition, there are numerous desirable locations with good recreational opportunities for pensioners and retired workers, particularly in the better developed northern areas.

## APPALACHIAN STATES

### Appalachian States—Tobacco Farms

This area is the primary tobacco land of the country. Farms range from 50 to 200 acres in size with wide variations in productivity. Some dairy cattle, poultry, and hogs are found on most of the farms in the area and provide a considerable portion of the family living and some income. Widest variations are in cash crops other than tobacco. In North Carolina, Tennessee, and to a lesser extent Virginia, small acreages of cotton are quite often grown. Fruit and vegetables are more common in southern Maryland and on the Eastern Shore. Peanuts have become much more important recently, especially in Virginia and North Carolina. Many farms raise grain (wheat and corn), and some of this is sold. Livestock as a cash enterprise is more common on the larger units, and hay and pasture become important. These units are most often found on the lower slopes of mountain areas.

Many different kinds of tobacco are grown in the area. Of these, burley and flue-cured for cigarettes are the most important. Dark tobaccos have become steadily less popular since World War

I, but are still grown on many farms, particularly in Virginia.

#### *The Job*

It is hard. Much field work is necessary in raising and harvesting and is followed by curing and handling after harvest. Some knowledge of tobacco culture and curing is essential, because quality has a substantial effect on the price. The level of family living is greatly influenced by adequate production of milk, eggs, and vegetables, which require versatile skills on the part of the operator.

#### *Outlook*

This area is the best suited in the country for this crop and will maintain its leadership in tobacco production. Production of cigarette tobaccos has good prospects, especially when some diversification and raising of home-used foods supplement the family income. In contrast, dark-tobacco demand has been decreasing for 25 years and only the most favorable lay-outs have even fair future prospects.

### Appalachian States—Fruit Farms

This region is one of the more important fruit areas of the country. Apples, peaches, and strawberries are major fruit crops, with apple farms predominant. Farms range from 50 to over 500 acres with a majority of acreage in fruit, especially on the smaller farms. Apples are widely grown, but are most common in the Shenandoah and Tennessee Valleys, western Maryland, and western North Carolina. Fewer peaches are grown, and are best in about the same areas as apples. Strawberries are concentrated in selected areas of eastern North Carolina, western Tennessee and Kentucky, and the Norfolk-Eastern Shore area of Virginia and Maryland. Strawberries often are one of several enterprises on truck-fruit farms, especially on the Eastern Shore. As in the Northeast, apples and peaches combine well with

dairy, livestock, or poultry. Fruit of some variety is often found on the general farms of this region.

#### *The Job*

It requires skill and experience to bring somewhat delicate crops through the year. Disease and weather must be constantly battled. Harvest and marketing must be timed to maximize returns. Fruit growers are less tied down, except in harvest, than are other farmers, but labor is quite hard and good supervisory ability is essential. Daily work requires considerable mechanical aptitude for equipment used and good judgment in timing seasonal operations. Bad investments are exceedingly dangerous because the cycle of growth covers such a long period. Due to this danger and

because of soil and topographical limits of fruit farming, the purchase should be most cautiously made.

#### *Outlook*

Areas having favorable soil and climate offer

good opportunities for well-informed, well-financed operators. Outside of the better areas, unfavorable production and marketing conditions are likely to force the continuation of recent declines in fruit enterprises.

## Appalachian States—Poultry Farms

This region includes the Delmarva broiler area. Broiler production is a highly specialized business with considerable risk. Family broiler enterprises involve raising from 5,000 to 25,000 chicks to about 3 months of age. Started at different times of the year, such enterprises are full-time jobs. Farms of this type are concentrated in the Delmarva or Eastern Shore area and, also, are scattered through the region. Larger investment is required but more stable incomes are received from a broiler-layer combination in which 1,500 to 2,500 birds are housed for egg production. Many different kinds of poultry farms are found in this region. A big share of the poultry, much of which is consumed on the farm, is produced as but one of several enterprises on a general or livestock farm; turkeys are widely raised on general farms.

#### *The Job*

The work is more specialized than dairy or general farming. As in most farming, certain chores, such as picking up and delivering eggs, feeding,

watering, and cleaning, must be done every day. Seasonally, houses must be disinfected, repairs made, birds killed and marketed. Mechanical aptitude is not so important as on farms with much field work, but good management and planning are essential.

Cleanliness is unusually important. High mortality, particularly among grown birds, can very quickly wipe out a year's profits. Cleanliness, a knowledge of diseases and their remedies, and establishment of disease-free stock are necessary to prevent high mortality.

#### *Outlook*

This area sells in the heavily populated Northeast and offers good opportunities to efficient, well-located poultrymen. Competition from surplus-feed areas will make "factory" broiler production less profitable but will have less effect on the poultrymen who grow some of their feed and have other farm enterprises. Further increases in breeding and hatching for sale offer profitable investment for operators skilled in this work.

## Appalachian States—Livestock Farms

Many kinds of livestock farms are found in this region. Most common sources of income on livestock farms are cattle, hogs, poultry, sheep, and horses. Many livestock farms in Maryland, Virginia, Kentucky, and Tennessee also sell some wheat. Beef cattle and hogs do very well so far as grazing and roughages are concerned, but there are few areas in this region where they can be fattened as cheaply as in the Corn Belt. Horses are an important side line as a hobby; horses and mules are a business in Kentucky, Tennessee, and northern Virginia. Sheep have been diminish-

ing as an enterprise in this region. A few dairy cattle and poultry are kept on nearly all livestock farms. The better livestock units are found in approximately the same areas as the better general farms—Virginia valleys and their Maryland extension, central basin and river valleys of Tennessee, and the bluegrass country of Kentucky.

#### *The Job*

Active resourceful management and a considerable amount of hard physical work is required. Roughage crops must be grown and harvested,

and livestock must be very carefully managed. Good knowledge of livestock care, breeding, and disease control is necessary. Very important is experience and market sense, for much of the profit in livestock farming results from good marketing.

#### *Outlook*

Livestock farms on the better rolling lands of this region offer good opportunities to good oper-

ators. Mild climate, good grassland, and fair markets are conducive to successful operation. Relatively high feed-growing costs prevail in the rougher lands, and fattening operations are risky, depending on bumper crops in surplus-feed producing areas. In the better situated sections, well-managed livestock units can offer good and fairly stable returns to operators.

## Appalachian States—Cotton Farms

It is a difficult business to grow cotton in most parts of this region. Most of it is grown in North Carolina and Tennessee, and a little is found in Virginia. From 5 to 15 acres of cotton is usually the major source of income. Other cash crops include peanuts, tobacco, vegetables, small grains, or seeds. Corn and hay are grown and fed to working livestock and to a few cows or chickens.

Additional enterprises have been typical of cotton farms during recent years because of reduced cotton acreage and a desire to operate better balanced farms. Recent trends in mechanization are accelerating these shifts.

Cotton-dairy combinations of from 100 to 200 acres are found in most cotton areas of the region. Cotton, tobacco, and peanuts are found in various combinations in some parts of North Carolina and Virginia, while cotton-livestock cultivation is more common in Tennessee.

#### *The Job*

Cotton and other enterprises that may be combined with it require exceptionally long days of work during the growing season. It is one of the hardest kinds of farming. Good knowledge of current methods is very desirable because of quality price premiums that accompany improved practices.

#### *Outlook*

This is one of the oldest cotton regions and for quality production it is one of the best. Some cotton will probably always be grown and may be more profitable than in prewar years, if mechanization is reflected in cheaper production. Cotton on 150- to 250-acre farms, balanced with other crop or livestock enterprises, offers fairly good possibilities to good operators.

## Appalachian States—Peanut Farms

Not a fully established type, for peanuts are usually grown in combination with cotton and tobacco, both high value crops. Peanut acreage expanded during the war, but less so in this area than farther south. Peanut farms in the area are concentrated in a relatively small section around the eastern end of the border between Virginia and North Carolina. Farm experience and possible quotas for cotton and tobacco will limit the quantity grown. Peanuts are sold as nuts if possible; but, in off years, it may be advantageous to graze hogs over part of the peanut crops. Nearly all farms have some livestock; largely for home use. With a growing demand for livestock products

and the need to rest peanut land, farmers will tend to sell more dairy and poultry products.

#### *The Job*

Peanuts, cotton, and tobacco require unusually large amounts of hand labor during the growing seasons. Much of this must be done by the operator and his family. Planting, growing, and harvesting these crops is tiresome and often very hard work. Some labor must be hired and supervised. Future prospects are for more mechanical aids, but these will require larger acreages and will bring more management problems. High value and price-for-quality characteristics of these crops

make it very desirable that the operator have good knowledge and working experience in their culture.

#### *Outlook*

The diversified nature of the peanut farm and

importance attached to it during the war make it a fair prospect for potential farmers. At present, there is some doubt as to the best peanut areas and best combination of enterprises which include peanuts. Mechanization and other technological developments should be carefully considered.

## Appalachian States—Vegetable Farms

The Norfolk-Eastern Shore area of this region is one of the major truck areas of the country, but high incomes are unusual. Metropolitan market gardening is not so common as in the Northeast.

Commercial units range from 50 to 150 acres with 150-acre units most common. Many kinds of vegetables are favored by climate in this region and are found to some extent on most farms. Vegetable areas are concentrated in the Norfolk-Eastern Shore of Virginia and Maryland, north-eastern Maryland, tidewater North Carolina, and the plateau of western Tennessee. Among vegetables commonly grown are tomatoes, peas, sweet corn, snapbeans, lima beans, melons, potatoes, spinach, and cucumbers. A family farm on the Eastern Shore may have 20 acres of potatoes, 5 of snapbeans, 6 of tomatoes, and 3 of strawberries.

A wider variety of vegetables and an increased proportion of retail sales are found on market garden farms surrounding Baltimore, Louisville, Memphis, Norfolk, Washington, and other urban districts. Larger farms, with fewer vegetables and more livestock (particularly dairy and poultry), are more common in the rolling lands of the higher Appalachian areas.

#### *The Job*

Vegetable production is concentrated in the summer months and requires long hours of hard physical work in the field, in the packing house, and in the street or market. The family works, but the operator must also be a good hirer and supervisor of seasonal help, mostly "stoop" laborers. Planning a combination of enterprises for the year, to prevent impossible seasonal labor peaks at harvest and to maximize returns by "hitting the market," pays high dividends. Picking at the right time or, occasionally, plowing a crop under and replanting require good judgment and managing ability.

#### *Outlook*

The skillfully operated market garden units offer good opportunities in this region for energetic operators. Commercial vegetable farming on a family scale does not offer, other than family living, very good prospects to the small operator. New processing and production methods favor continued increases in units larger and more expensive than those discussed here.

## Appalachian States—Dairy Farms

Specialized dairy farms are of two distinct types, depending on the method of marketing. Near urban areas the farms are more expensive but not necessarily larger in acreage; whole milk is sold under stringent sanitation regulations to city dealers at relatively high prices. These fluid-milk farms are all over the area, but are numerous in the Baltimore-Washington, Louisville, and Memphis milksheds. The second marketing type, under high but less stringent sanitation regula-

tions, sells milk or butterfat to manufacturing plants where it is processed into evaporated milk, cheese, butter, and other milk products. This type is most numerous on the rolling land of Kentucky and Tennessee.

Many dairy farms of this region are not completely specialized, but depend for some income on cash crops and other livestock products. Of these, fruits, poultry, and vegetables are most common. Grain and hay are sold from some farms. In a

few areas, small acreages of cotton and tobacco are grown. While none of these is a major source of income, each assists in building up farm revenue and adds to profitable employment of farm resources.

#### *The Job*

Requires an active, resourceful man who can do a variety of jobs with at least average skill and, also, book and paper work necessary for good farm planning. Mechanical aptitude is necessary because a milking machine, farm truck, light tractor, mower, rake, sprayer, and other field equipment

must be kept in operating condition, and buildings kept in repair. An understanding of livestock characteristics and weaknesses is essential, as well as skill in handling pasture and feed crops.

#### *Outlook*

Good opportunities in this region. Much of the land is well suited to dairy-farm needs, and developed markets are available. Experienced operators on the better farms can find profitable year-round employment with less fluctuation of income than on specialized crop farms.

## Appalachian States—General Farms

From 120 to 500 acres, but cropland is not correspondingly larger in comparison with other types. Income is received from some combination of dairy, other cattle, horses, sheep, poultry, fruit, vegetables, tobacco, cotton, cash grain, peanuts, and other sources. Actual combination depends on soil, lay-out of farm, and preferences of the operator.

Among the best of this region are those in the Shenandoah area of Virginia and its Maryland extension, the central basin and Tennessee Valley in Tennessee, and the bluegrass country of Kentucky. All these areas emphasize livestock including dairy, beef cattle, sheep, and horses. Virginia and Maryland areas have considerable fruit. Potatoes and other vegetables are commonly grown as cash enterprises.

Many general farms are found in other parts. Income combination varies with localities, with more livestock on rolling lands and more cash crops on flatlands of the river terrace and tide-

water. Cotton, tobacco, peanuts, potatoes, fruit, and vegetables are widely grown.

#### *The Job*

The operator must be vigorous, resourceful, well-trained and skilled in management. A wide variety of jobs must be well done and well supervised. Some knowledge of production methods and operating problems, such as disease control in cattle, poultry, sheep, fruit, vegetables and field crops, and fertilization, is necessary.

#### *Outlook*

General farms in this region offer good opportunities. The better located ones are among the best of their kind in the country. Planned to give full employment all year and to take advantage of their resources, these farms should be successful. Their year-to-year variations in income are exceptionally small compared with other types, but income may often be lower than those of specialty units.



## Appalachian States—Part-Time Farms

Part-time farms are common in the Appalachian area. There are few urban areas, but much seasonal work in mines and forests.

Units range from 5 to 25 acres with a garden, small pasture, probably a cow and pig or two, small flock of chickens, and maybe a few fruit trees. None of this offers either large cash results or the often advertised "5-acres-and-independence." Whenever the lay-out calls for full-time work by the operator and family or large cash expenses, the farm is no longer part time. Variations usually reflect soil resources of the farms and whims of the operator. Some don't like livestock and have none. Some have seasonal jobs, which allow time for a small market garden or livestock. Others have large units with poor soil and have several dairy cows that are pastured on the farm but must be fed on feed and hay brought from the outside.

### *The Job*

Fairly light work of a wide variety is customary.

However, lack of equipment makes some work harder than similar effort on commercial farms. This may demand considerable time of the operator, whose main purpose is to add to his real income by well-directed use of spare time.

### *Outlook*

More part-time units can be expected as work-weeks are reduced, submarginal farms fail as commercial units, pensioners find suitable locations, and urban people indulge their back-to-the-farm urge. Successful ones will be operated by families which buy within the limits of their resources and operate within the limit of their ability, both physical and financial. Lack of markets in this area and the present lay-out with full-time farms, successfully operated around most cities, tend to limit prospects of commercial part-time operation. However, the cow-chicken-hog-garden units, for family use only, will continue to be numerous as enterprising families try to stretch meager incomes to meet their needs.

## SOUTHEAST STATES

### Southeast States—Cotton Farms

This region is the older cotton South. Small units with small incomes are now typical. Cotton is the main cash enterprise of the South. Farms with from 5 to 15 acres of cotton, 5 to 10 of corn, some hay, a mule, a pig, a cow, and chickens are found in all States of the region.

During recent years, the addition of more land and other cash enterprises has become the goal of many cotton farmers who formerly raised little else. In some areas, especially in the Coastal Plains of Florida, Georgia, and Alabama, peanuts have been successfully substituted for part of

the cotton. Also, tobacco has been of increasing importance in some sections of South Carolina, Georgia, and Florida. In the northern hilly areas dairy cattle add cash income to a considerable number of farms. Truck crops and sweetpotatoes are other sources of additional income over most of the region. Poultry as a cash enterprise is slowly becoming more common. With the increases in tractors during recent years, many units have added a considerable acreage of small grains. Well-managed forest land is a farm enterprise in selected areas.

Cotton is the biggest cash crop in the South. Much hard work such as the picking shown below limits the number of acres handled by any one farmer.

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*The Job*

Cotton and crops found in combination with it require exceptionally long days of work, especially during the harvesting season. Relative to the income received, this is one of the hardest kinds of farming. Good knowledge of current methods is very desirable, because of quality price premiums on crops grown. Skill in handling of soils and use of fertilizer also is necessary.

*Outlook*

This is one of the oldest cotton regions. Some

cotton will probably always be grown. If mechanization is reflected in cheaper production, fewer units and higher returns should be expected. Cotton on 150- to 250-acre farms, balanced with other crop or livestock enterprises, offer fairly good possibilities to operators. Cotton-peanuts-hogs and cotton-vegetable combinations offer diversity and higher incomes to units lacking room to expand to the more extensive dairy or livestock enterprises. Good living is unlikely on very small specialized units.

## Southeast States—Peanut and Pecan Farms

Peanut production is an important enterprise on many southeastern farms. Pecans, though much less important, are grown over a wider area. Peanuts are usually grown in combination with cotton and a little livestock. The four States in this region grow over half the peanuts of the country; most of the production comes within a 200-mile radius of the Georgia-Alabama-Florida boundary intersection.

Peanut farms range from 30 to 125 acres and have 15 to 20 or more acres in cotton and peanuts. Important peanut varieties include the Spanish and Runners, which may be used for hogging off or dug for sale. Spanish are usually dug for edible sale.

Cattle, poultry, truck crops, and sweetpotatoes add to cash income and farm family living on larger units or units having a limited acreage of soil suitable for peanuts. Corn and roughages are grown for home feed.

Pecans, though more widely grown than peanuts, are also limited by type of soil. With few exceptions, pecans are but one of the enterprises on fairly large cotton-peanut or cotton-livestock farms. Pecan orchards are expensive to develop and operate. However, where well established, they usually are a good source of income.

*The Job*

Peanuts and cotton require unusually large amounts of labor during the summer and fall. Much of this must be done by the operator and his family. Planting, growing, and harvesting is tiresome and often very hard work. Some help must be hired and supervised. Future prospects are for more mechanical aids, but these will require larger acreages and greater management problems.

Peanuts and pecans both require a high degree of skill and experience in production methods. High value and price-for-quality characteristics of these crops make it highly desirable that the operators have adequate knowledge and working experience in their culture.

*Outlook*

Diversified nature of peanut and pecan farms and important developments in the use of peanuts during the war make them a fair prospect for potential farmers. For those interested in peanuts, this is one of the most favorable areas. However, large-scale mechanization and new production methods favor larger units than most of those now available.

## Southeast States—General-Livestock Farms

Livestock and general farms in this region are rare. Competition for good land has kept the land in high value per acre crops and not in feed for roughage-consuming livestock; most farms are too small for livestock farming and production and marketing problems have been unusually difficult. Sheep numbers have been steadily decreasing, but cattle and hog volume has remained about the same for 30 years. There are some fair general farms in the Piedmont and Coastal Plains of Georgia and a few good livestock farms in areas like the Black Belt of Alabama.

Some units in the Alabama Black Belt are very similar to livestock and general farms in the Midwest and in the North, with a few beef cattle, hogs, some poultry, and cropland in corn, hay, and pasture. Small acreages of cotton and other cash crops are grown. In the Coastal Plains of Georgia, Alabama, and Florida, cattle and hogs are grazed over waste and undeveloped land. Cattle gain weight very slowly and losses from parasites have been high.

Also in the Coastal Plains are the peanut-hog farms, similar in organization but not in produc-

Some farms are called general farms or just farms. On them, the operators may have a few cattle, hogs or chickens. They raise feed for the livestock, have one or two cash crops, and may sell some firewood or timber from a relatively large woodland acreage. Of all farms, these tend most to be self-sufficient.

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tivity to the corn-hog farms of the Corn Belt. In the Piedmont, a few livestock units are found on land whose productivity is too low for cotton, peanuts, or other cash crops.

#### *The Job*

Requires active, resourceful management, and a considerable amount of physically hard work. Roughage crops must be grown and harvested, and stock must be very carefully managed. Knowledge of livestock care, breeding, and disease control is necessary. Very important is experience and market sense, for much of the profit in livestock farming results from good marketing.

#### *Outlook*

It is fair for livestock farms in a few areas. General farms have slightly better prospects, for they have stability in income and can take advantage of spotty land where a few acres of good cropland and more acres of rough land can be skillfully used for some combination of cash crops and grazing livestock. Recent developments in production techniques for improved pastures, feed crops, hay, and livestock are likely to improve this situation considerably. Income though stable is usually lower than that from specialty farms with comparable investments.

## Southeast States—Dairy Farms

This is a stable but not too prosperous business for small operators. Most dairy units in this region have from 10 to 15 cows; raise fodder, hay, and some grain; buy more grain and hay; and sell milk on the relatively low-price processing market. These units have from 100 to 150 acres with about half in crops. Poultry and a few pigs are kept, and other cash enterprises, such as sweetpotatoes or other vegetables, add to cash income. Income varies with size of unit, location, type of cattle and, most of all, with skill of operator.

In contrast to the family units described above are the large dairy "factories" common to areas near the larger cities in this region. These units have 100 or more cows, buy practically all feed, including roughage, and usually retail their milk. Unusually high investment and operating costs limit these units to operators with excellent experience and strong financial backing.

#### *The Job*

Requires an active, resourceful man who can do a variety of jobs with at least average skill and,

also, paper and book work necessary for good farm planning. Mechanical aptitude is necessary because of milking machine, farm truck, light tractor, mower, rake, sprayer, and other field equipment must be kept in operating condition, and buildings kept in repair. An understanding of livestock characteristics is essential. Knowledge of soils, feed crops, pasture use, and fertilization is necessary.

#### *Outlook*

The opportunities for dairying are only fair even though most of this region is on an import basis for dairy products. An extremely low per capita consumption of milk and milk products should improve as purchasing power moves up with expected industrialization. Skilled operators will find good markets, but they must continue to face serious production difficulties in the raising of cheap roughages and they must compete for land with high-value crops such as cotton, peanuts, truck, and fruit. They should develop good pastures and strains of high-producing, hardy, dairy cattle.

## Southeast States—Fruit Farms

As a commercial venture, fruit is one of the most hazardous in this area. Citrus areas of central Florida are outstanding, although some fruit is grown throughout the region, including the well-known peach area in central Georgia. Except for citrus and a few peach farms, most fruit is grown in combination with other crops or livestock. Apples and peaches are grown in the northern, hilly parts of the region. Also grown, mostly in Florida, are persimmons, papayas, avocados, guavas, pears, and figs.

Most of these fruits are grown on small acreages. Even the small acreages are expensive to buy and operate. Citrus units of about 10 acres, peaches and pears of 20, and apples of 40 can be handled by one family, except for harvest. Crops can be grown in combination, especially when they supplement each other in demands for labor. For example, in Hillsborough County, Fla., citrus, strawberries, and peppers are grown on the same farm. Tomatoes and green beans can also be fitted to these organizations.

### *The Job*

Commercial fruit farming requires skill and ex-

perience to bring somewhat delicate crops through the year. Disease, insects, and weather must be constantly battled. Harvest and marketing must be timed to maximize returns. Fruit growers are less tied down, except in harvest, than are other farmers, but the work is quite hard and good supervisory ability is essential. Daily work requires considerable mechanical aptitude for equipment used and good judgment in timing seasonal operations. Bad investments are exceedingly dangerous in tree-fruit farms, because the cycle of growth covers such a long time. Due to this danger and because of soil and topographical limits of fruit farming, the purchase should be most cautiously made.

### *Outlook*

Commercial fruit farming in areas having favorable soil and climate offer good opportunities for well-grounded, well-financed operators. Higher per capita fruit consumption, mild climate, and seasonal markets are particularly favorable to the smartly operated fruit farm.

## Southeast States—Poultry Farms

Farm flocks are most typical in this region; however, commercial poultry raising has been increasing in recent years. A family broiler enterprise involves raising from 5,000 to 25,000 chicks to about 3 months of age. Started at different times of the year, such an enterprise is a full-time job. Farms of this type are scattered throughout the region, with a concentration in Northern Georgia. More investment is required but more stable incomes are received from a broiler-layer combination in which 1,500 to 2,500 birds are housed for egg production. A big share of the poultry in this region is in small flocks on crop farms.

### *The Job*

The work is quite specialized. As in most farming, certain chores, such as gathering and delivering eggs, feeding, watering, and cleaning, must be done every day. Houses must be disinfected and repairs made; birds killed and marketed or separated for sale. None of this is very hard physically but it is monotonous. Mechanical aptitude is not so important as on farms with much field work, but good management and planning are.

Cleanliness is unusually important in poultry farming in this area. High mortality, particu-

larly among grown birds, can very quickly wipe out a year's profit. Among the best protections against disease are cleanliness, knowledge of diseases and their remedies, and establishment of disease-free stock.

#### *Outlook*

Increases in per capita consumption of poultry and eggs are expected. In spite of relatively high

feed costs, this region is likely to increase its poultry production somewhat, particularly broilers. In part, these increases represent a catching up with fast progress made in other regions, but they are to be expected because of recent improvements in production techniques and the small acreages needed for poultry. In part, additional progress will be limited by marketing facilities and outlets.

## Southeast States—Tobacco Farms

South Carolina and Georgia are the important tobacco States of this region. The farms range from 50 to 250 acres in size. Supplementary sources of income include cotton, dairy, poultry, hogs, fruit, peanuts, sweetpotatoes, and other vegetables. Flue-cured tobacco is most commonly grown, although Georgia and Florida grow some heavier cigar tobaccos including a small acreage of high-priced shade-grown tobaccos.

#### *The Job*

Much hard work is involved, and much hand labor is necessary in the summer months. Labor requirements are often over 50 man-days per acre. Curing and handling are necessary after harvest.

A knowledge of tobacco culture and curing is essential, because quality has a substantial effect on its price. The level of family living on small units also depends on adequate production of milk, eggs, and vegetables which require diverse skills on the part of the operator.

#### *Outlook*

Some areas of this region are well suited to tobacco. Production of lighter cigarette tobaccos has good prospects—better in some areas than cotton or peanuts. As this is an allotment crop, purchasers should be sure of a good base and reasonable price.

## Southeast States—Vegetable Farms

The Southeast has been an outstanding producer of fresh vegetables for early and "out-of-season eastern markets." Farms range from 20 to 300 acres, with most units from 50 to 125 acres. Intensity varies widely; for example, 30 acres in Sanford celery is quite likely to net an income equal to 200 in early potatoes. While vegetables are widely grown in small commercial acreages, the most concentrated production is on the Florida east coast, the Okeechobee area, and on the coastal plains of Georgia and South Carolina.

Peppers are concentrated in central Georgia and the Florida coastal areas. Tomatoes are widely grown with large acreages in Florida. Watermelons are also widely grown, but are heavily produced in the coastal plains of Georgia and South

Carolina. Other vegetables include potatoes (early Irish in Florida and Alabama), sweetpotatoes, asparagus, sweet corn, cucumbers, cabbage, peas, lettuce, onions, turnips, and less popular varieties.

Most commercial production has been for early sales in metropolitan centers of the Northeast and Midwest. A few vegetables, such as peppers, are grown almost exclusively in this area.

#### *The Job*

Vegetable production requires long hours of hard physical work in the field and in the packing house. The family works, but the operator must also be a good hirer and supervisor of seasonal help, mostly "stoop" laborers. Planning lay-out for the year, to prevent impossible seasonal labor

peaks at harvest and to maximize returns by "hitting the market," pays high dividends and requires good judgment and managing ability.

#### *Outlook*

The early market and specialty or high-quality trade offer good opportunities in this region for energetic operators. The remainder of commer-

cial vegetable farming does not offer, other than a living to the small operator, very good prospects. New processing and production methods favor continued increases in units larger and more expensive than those discussed here. These developments also favor more highly productive areas in the north and central sections of the country not formerly in competition with the Southeast.

## **Southeast States—Part-Time Farms**

The number of part-time farms in the Southeast has been increasing. They usually have from 5 to 25 acres with a garden, small pasture, a cow and pig or two, small flock of chickens, and a few fruit trees. None of this offers either large cash results or the often advertised "5-acres-and-independence." Whenever the lay-out calls for full-time work by the operator and family or large cash expenditures, the farm is no longer part time.

Variations usually reflect soil resources of the farm and whims of the operator. Some do not like livestock and have none. Others do not like crops. Some have jobs which allow time for a small market garden.

#### *The Job*

Fairly light work of a wide variety is customary. Some of this work may be exacting, and the operator whose main purpose is to add to his real in-

come by well-directed use of his spare time has little leisure.

#### *Outlook*

Additional part-time units can be expected as workweeks are reduced, submarginal farms fail as commercial units, pensioners find suitable locations, and urban people indulge their back-to-the-farm urge. Units will be successfully operated by families who buy within the limits of their resources and operate within the limits of their ability, both physical and financial. Cow-chicken-hog-garden units, for family use only, will continue to be numerous as enterprising families try to stretch meager incomes to meet family needs. This is especially true in Florida where winter employment in resort areas can be combined with summer farming.



## MISSISSIPPI DELTA STATES

### Mississippi Delta States—Cotton Farms

This region includes some of the best and some of the poorest cotton farms. Delta soils are among the most productive in the country. Family units here range from 40 to 150 acres and are usually rented as a part of a former plantation with from 5 to 30 acres in cotton and somewhat more in corn. All units have been shifting from mule to tractor power and replacing part of their cotton with oats, hay, corn, and soybeans. Oats followed by lespedeza have become important on most Delta farms with over 50 acres of cropland.

In the hill land of the Delta States, family units are larger and have more acres of cotton. Livestock is not much more important on these farms than in the Delta areas.

Oats, lespedeza, soybeans, truck crops, dairy cattle, hogs, beef cattle, and sheep are found in combination with cotton throughout the region. Oats followed by lespedeza became very much more important on Delta soils during the war and are expected to stay. Soybeans for beans became important too, but low yields resulting from weather conditions indicate that other alternatives may be more desirable. Livestock offers diversity and additional income.

#### *The Job*

Cotton and cash crops found in combination with it require long days of work during the growing and harvest season. Relative to the income received, this is one of the hardest systems of farming. Knowledge of current methods is very desirable, because of quality price premiums on the crops grown. On larger livestock-cotton units an understanding of general farming is essential, including skill in use of fertilizer and handling of soils.

#### *Outlook*

The Delta lands offer one of the best opportunities for prospective farmers, although farms will be difficult to buy and opportunities for new farms are limited. Productive soils and adaptability to mechanization are found in excellent combination. Diversity in hay crops, soybeans, oats, and livestock (also benefiting from technological advances) add to the prospects for farms on this land. Upland cotton farms probably will shift steadily toward larger units and toward more of the alternatives mentioned above. Cotton, however, will continue as the major source of cash income.

### Mississippi Delta States—Fruit Farms

Commercial fruits and vegetables of this region are grown in about the same areas. Strawberries are the big fruit crop of this region, accounting in 1943 for about half the fruit income from the region. Largest acreages of strawberries are in the Hammond area of Louisiana and in western Arkansas. Grapes are grown mostly in northwestern Arkansas, oranges and tangerines in the extreme south of Louisiana, apples and blackberries in the hill land of Arkansas, and peaches on the uplands of both States.

Most fruit is grown in combination with vegetables, a little cotton, and some livestock. Units

range upward from 20 acres. Peach orchards are the main enterprise on a few farms largely in the hill areas of Arkansas.

#### *The Job*

Work is hard and requires both skill and experience to bring somewhat delicate crops through the year. Disease and weather must be constantly battled. Harvest and marketing must be timed to maximize returns. Fruit growers are fairly tied down to the farm, especially at harvest. Good supervisory ability is essential at harvest. Daily work requires mechanical aptitude for equipment

used. Bad buys are especially dangerous, because the cycle of growth covers such a long time. Due to this danger and because of soil and topographical limits of fruit farming, the purchase should be most cautiously made.

#### *Outlook*

Commercial fruit farming in areas having fa-

vorable soil and climate offers a good opportunity for the well-grounded, well-financed operator. Farms geared only to the high-price early markets must compete with areas taking advantage of recent advances in processing, particularly quick freezing. Further development in some areas will depend on market outlets and facilities.

## Mississippi Delta States—Truck Farms

The Delta States form an important early and late fresh vegetable area with some market gardens and a large amount of shipping. Some vegetables are grown all over the region, but commercial production on an intensive scale is concentrated in southern and northern Louisiana, southwestern and central Mississippi, northwestern, southwestern, and to some extent northeastern Arkansas. Units range from 20 to 200 acres with wide diversification, including tree fruits and livestock on the larger units.

Wide variety of crops is grown in the southern Louisiana areas with some very intensive small units growing two or more crops on the same land. In some parts of this area strawberries and truck are combined; in others sugarcane, potatoes, and truck; sweetpotatoes are widely grown for sale, home use, and feed.

Commercial vegetables in Arkansas have still more varied combinations with very heavy concentrations of tomatoes but considerable diversity, especially in the western areas. In the Fayetteville area, strawberries, peaches, dairy, poultry, and a broad range of vegetables are combined in many ways. In the more southern areas, some cotton is grown on the vegetable farms along with considerable fruit.

Mississippi areas have fewer commercial vegetable farms, but have many combinations with

dairy, poultry, fruit, and cotton. Outside of these concentrations, some vegetables on smaller acreages are grown for sale.

Among the most important vegetables are tomatoes, beans, cabbage, cucumbers, shallots, onions, melons, watermelons, and potatoes. Peas, lima beans, beets, carrots, sweet corn, and a number of other vegetables are also grown.

#### *The Job*

It requires long hours of hard physical work in the field and in the packing house. The family works, but the operator must also be a good hirer and supervisor of seasonal help, mostly "stoop" laborers. Planning lay-out for the year, to prevent impossible seasonal labor peaks at harvest and to maximize returns by "hitting the market," pays high dividends and requires both good judgment and managing ability.

#### *Outlook*

Early market and specialty or high-quality trade offer good opportunities in this region for energetic operators. The remainder of commercial vegetable farming does not offer, other than family living, very good prospects to the small operator. New processing and production methods favor units larger and more expensive than those discussed here.

## Mississippi Delta States—Dairy Farms

Fairly stable, but not too prosperous business, for the small operator. Most common units in this region have from 10 to 25 cows; raise grain, silage, hay, and some fodder; usually buy additional grain. They have from 50 to 150 acres with about half of it in crops with some cotton. Poultry and a few pigs are kept, and some other enterprise, such as truck crops, add to cash income.

Income varies with size of unit, location, type of cattle and, most of all, with skill of the operator. Dairying in this region has slowly become an accepted farming system as other alternatives became less profitable and as technical problems in cattle disease and growth of roughages have been solved.

Large producer-distributors are common to areas near the larger cities in this region. These units have 100 or more cows, buy much of their feed including roughage and usually retail their own milk. Unusually high investment and operating costs limit these units to operators with excellent experience and strong financial backing.

### *The Job*

Working dairy farms require an active, resourceful manager who can do a variety of jobs with at least average skill and, also, paper and book work necessary for good farm planning. Mechanical aptitude is necessary because a milking machine, farm truck, medium tractor, mower, rake, sprayer, and other field equipment must be kept in operating condition, and buildings kept in repair. Skill in handling livestock and pastures is essential.

### *Outlook*

Fair for dairying. An extremely low per capita consumption of milk and milk products will improve, if purchasing power stays above prewar levels. Skilled operators will find good opportunities, but must continue to face marketing problems and serious production difficulties in the raising of good roughages. They must compete for land with high value crops and develop good pastures, as well as foster the breeding of strains of high-producing, hardy dairy cattle.

## Mississippi Delta States—Poultry Farms

Commercial poultry has increased in this region in recent years, especially in Arkansas. Farm flocks for home use are still very common—in 1943, more than one-third of the chickens in the region were consumed on the farms compared with 10 percent in the Northeast. However, in recent years large broiler units have been increasing particularly in Arkansas and the number of turkeys have increased considerably in Arkansas and northern Mississippi.

### *The Job*

The work is quite specialized. As in most farming, certain chores must be done every day; eggs must be picked up and delivered; feeding, watering, and cleaning cannot be neglected. Houses must be disinfected, birds killed and marketed or

separated for sale, and repairs made on equipment. None of this is very hard physically but it is exacting work. Mechanical aptitude is not so important as on farms with much field work, but good management and planning are.

Cleanliness is unusually important in poultry farming. High mortality, particularly among grown birds, can very quickly wipe out a year's profits. Among the best protections against disease are cleanliness, knowledge of diseases and their remedies, and establishment of disease-free stock.

### *Outlook*

An increase in per capita consumption of poultry and eggs is expected. In spite of present relatively high feed costs, this region is likely to ex-

pand production, particularly broilers and turkeys. In part, these increases represent a catching up with the progress made in other regions, but

they also are to be expected because of recent improvements in production techniques and small acreages needed for poultry.

## Mississippi Delta States—Rice Farms

This is the major rice region of the country. Farms vary from 150 to 300 acres with roughly a third of the land in rice. Corn, oats, soybeans, and hay are also grown, largely for livestock feed. Rice farms are limited to fairly level lands with soil of the type suited to rice. Central Arkansas, the Louisiana-Gulf coast extending down along the coast of Texas, plus the Central Valley of California are the areas which grow practically all the country's rice.

Large units are quite common and the number may increase with the introduction of mechanization. Within limits of desirable rotations, this shift may also increase rice acreages on present farms, if land is no longer needed for raising feed for work stock.

### *The Job*

The size of investment on rice farms determines management problems. On smaller units, there is a wide variety of mechanical and laboring jobs that require skill and a strong body. A knowledge of pumping-plant operation and irrigation are essential. Rice growing is a highly specialized type of farming and should be thoroughly studied before commitments to buy or rent are made.

### *Outlook*

The expansion of rice growing is limited by water and soil. There is little further prospect for new farms. Introduction of mechanization and relatively limited markets probably will establish rice prices lower than present levels and hold production to the more efficient farms.

## Mississippi Delta States—Sugarcane Farms

Cane production is concentrated in the lower part of the region, although some cane is grown in most of the humid south. Except for a small area near Lake Okeechobee, Fla., commercial sugarcane is concentrated on plantations and family farms in southern Louisiana. Most family farms range from 50 to 200 acres with about half the land in crops. Some cotton, sweetpotatoes, and vegetables may be grown in a diversified farming program. Feed crops, usually corn, occupy about as much land as sugar, because of desirable rotation practices. A large part of the cane is produced on large plantations.

### *The job*

Cultivation and harvesting of sugarcane is hard

physical work. Unless modern machines are used, the operator and his family can do only about 10 percent of the total work. Some labor must be hired and supervised.

Quality and tonnage depend on the operator's knowledge of cane varieties and proper techniques in production. Rapid increases in mechanization place a still heavier burden on the managerial skills of the operator.

### *Outlook*

Family cane farms with some diversification offer a good living to a few energetic operators with good financial backing. However, most commercial cane will continue to be grown on the larger plantations.

## Mississippi Delta States—Pecan Farms

Pecans are quite widely grown in this area. Orchards are found principally in the Shreveport area of Louisiana and the Mississippi-Gulf coast. Many orchards in the Gulf-coast areas are the main enterprise on farms of from 50 to 150 acres. In the Shreveport area, farms are larger and grow cotton, corn, hay, and peanuts.

### *The Job*

High value and price-for-quality characteristics

of pecans especially make it very desirable that the operator have extensive knowledge and working experience in their culture.

### *Outlook*

Pecans are more favorably grown outside the region, though they make a good additional enterprise in certain areas.

## Mississippi Delta States—Part-Time Farms

A few part-time farms are scattered around New Orleans and other urban areas. Lack of cropland and high land values tend to discourage part-time farming. Some successful units are found around mill town, but are largely confined to residence units with very small off-farm sales.

They usually have from 5 to 50 acres, some combination of a garden, small pasture, a cow and a pig or two, small flock of chickens and a few fruit trees. None of this offers large cash results or the often advertised "5-acres-and-independence." Whenever lay-out calls for full-time work by the operator and family or large cash expenditures, the farm is no longer part time.

### *The Job*

Fairly light work of a wide variety is customary. None of this is too demanding on the oper-

ator, whose main purpose is to add to his real income by well-directed use of spare time.

### *Outlook*

More such units can be expected as workweeks are reduced, submarginal farms fail as commercial units, pensioners find suitable locations, and urban people indulge their back-to-the-farm urge. Successful units will be managed by families which buy within the limits of their resources and operate within the limits of their ability, both physical and financial. The lack of markets in this area and the limited number of desirable locations will discourage any great expansion in this field. However, the cow-chicken-hog-garden units for family use only will continue to be numerous as enterprising families try to stretch meager incomes to meet family needs.

## OKLAHOMA AND TEXAS

### Oklahoma and Texas—Cash Grain Farms

One of the most fully mechanized types of farm. Those of family size vary from 160 to over 1,200 acres; about 400 acres is the minimum acreage needed for efficient operation. Wheat and grain sorghum are the main crops in the northwestern part of the section. Corn, oats, barley, and rye are also grown. Broomcorn is a specialty crop in Oklahoma.

Low rainfall of the western part of this region limits dry-land farms to grains such as wheat, sorghums and rye. Some livestock is also kept as a complementary enterprise using wheat pasture, native pasture land and sudan pasture. Sorghums, corn, and wheat are sometimes used in feeding out cattle or sheep. Steady increase in acreages has resulted from low yields and mechanization, mostly in the past 25 years. Today, the more successful dry-land farmers operate from 800 to 1,200 acres.

In broken areas of the Panhandle, some cash grain-livestock combinations are successful; but specialization is still the more common. In the East and South, cotton and other cash crops reduce cash grains to minor enterprises.

Rice production is limited to favorable soils in the coastal prairie of southeastern Texas. Rice

units are more fully presented under Mississippi Delta types of farms.

#### *The Job*

Requires an active, resourceful man who can do many jobs with at least average skill and, also, paper and book work necessary for good farm planning. Mechanical aptitude is necessary, as the combine-harvester, truck, tractor, drill, and a wide variety of other field equipment must be kept in operating condition. Availability of working equipment, when needed, is vital on these highly mechanized farms. An understanding of livestock is desirable.

#### *Outlook*

This region contains some of the best wheatland in the Nation. Although wheat has been a surplus crop, large acreages of it will continue to be grown. With sufficiently large acreage, well operated, farmers can provide their families with an adequate living in all but drought years. New and more easily produced grain sorghums are steadily increasing in many sections. Rice probably will not hold its wartime peaks.

### Oklahoma and Texas—Cotton Farms

Cotton is grown in all but the most arid and most northern areas. Even in the arid western and southern districts, cotton farms are found on the few favorable soil types. In the extreme western part of Texas, cotton is grown under irrigation in the El Paso district.

Acreages operated range from under 10 to over 1,000, but most common are those from 20 to 100 acres in cotton, on farms from 50 to 360 acres. Although widely grown, cotton has definitely favorable areas. These are the Corpus Christi, High Cotton Plains, Rolling Plain, Black and Grand Prairies, and Rio Grande irrigated areas of Texas,

and southwestern and central Oklahoma. On some farms even in the best of these areas, soil or climate may make production impossible.

Mechanization of cotton production has advanced more in this region than in any other. Large tractor operations are common, especially in the Corpus Christi High Plains and Black Waxy areas of Texas. There are great variations in competing or supplementary enterprises. These include practically every enterprise of the area. Most common in the dry-land sections are wheat, grain sorghums, and livestock; rice, fruit, vegetables, small grains, and livestock are

important in southeast Texas; peanuts are an important competitor on light, sandy land in both States. Livestock usually means beef cattle. However, dairy cattle and poultry enterprises have been considerably increased in recent years, particularly on farms with relatively small cotton allotments.

#### *The Job*

Cotton and crops found in combination with it require exceptionally long days of work during the growing season. Relative to the income received, this is one of the hardest kinds of farming.

Knowledge of current methods is very desirable, because of quality price premiums and wide variations in yield and growing conditions and recent developments in mechanization.

#### *Outlook*

For large-scale production, this region contains some of the best cotton areas. Some cotton will always be grown. However, if mechanization is reflected in lower-cost production, large units and more stable returns should develop. Cotton on 150- to 400-acre farms, balanced with other crop or livestock enterprises, offers good possibilities to intelligent operators.

## Oklahoma and Texas—Range Livestock Farms

Organizations vary widely in this type of operation common to the broken and arid lands. Some ranches are found in every type of farming region, but are concentrated in areas like the Edwards Plateau; "Breaks" of the Rio Grande, Canadian, Brazos, Pecos, Colorado, Red, and Arkansas Rivers; partly drained areas of the Coastal Plains, and rougher lands of the High and Rolling Plains of both States. Sheep and goats are most common on the Edwards Plateau. Cattle are everywhere.

Hay is the usual ranch crop, and considerable wheat and sorghums (grain and forage) are grown. Most ranches have headquarters units raising a wide range of grains, hay, potatoes, and other vegetables. However, the usual ranch operator is interested in grazing a maximum number of livestock and maintaining only enough cropland to insure a supplemental and emergency feed. This practice is encouraged by lack of sufficiently large contiguous tracts of cropland in the grazing areas.

Family units range from 100 to 500 cattle and 750 to 1,500 sheep. Stock is grazed on both public and private land. Large land ownership is convenient, but not necessary. Water rights are essential.

#### *The Job*

Range livestock does not demand unusually heavy or monotonous work. Management skill and knowledge of livestock are important both in raising and marketing. If combined with irrigated farming, harder work and a still higher degree of managerial skill in planning and operating are required.

#### *Outlook*

Steadily increasing markets for meat favor range livestock operation. Well-managed units, particularly in the Trans-Pecos and Edwards Plateau, are among the best ranches in the country. A high degree of skill and substantial assets are prime requisites, and with them this region holds good prospects.

## Oklahoma and Texas—Dairy Farms

Although dairy cow numbers have been increasing, there are still relatively few dairy farms. Most of them are in the East. Usually they are medium-sized farms from 160 to 300 acres, whose operators have increased their dairy at the expense of other cash enterprises. Some wheat, corn, and oats are grown, and some sheep or cattle may be fed out. Occasionally, these other enterprises may contribute a major part of the income, but, during most years, the dairy herd of from 15 to 40 cows is the chief source of money. Milk is usually sold on a butterfat basis to creameries and processing plants.

A considerable number of the more specialized farms are concentrated near the larger towns and cities such as Tulsa, Oklahoma City, El Paso, Houston, Dallas, Fort Worth, San Antonio, and Galveston. Whole milk is sold under strict sanitary regulations for fluid use in town. More cows are milked and more feed is both raised and bought than on the butterfat type of farm, al-

though the fluid-milk farms may be smaller in acreage. They often include wheat and sometimes cotton farming.

### *The Job*

A resourceful operator is required who can do a variety of jobs with at least average skill and, who also, is well-schooled in dairy husbandry. Mechanical aptitude is necessary because a farm truck, tractor, and a considerable quantity of field and barn equipment must be kept in operating condition, and buildings kept in repair. An understanding of livestock characteristics is essential.

### *Outlook*

Good opportunities in the eastern part. Much prairie land is well suited to dairy farming, and developed markets are available. Experienced operators on the better properties can find profitable year-round employment with less fluctuation of income than on crop or livestock farms.

## Oklahoma and Texas—Fruit Farms

Fruit is not a primary crop, although it is grown commercially on farms of widely varying size in a few areas. Irrigated citrus orchards (grapefruit and oranges) of the lower Rio Grande Valley are best known, but they cover a very limited area. A few cherries are grown in the coast prairie around Galveston. Peaches and a few apples are found in the rolling prairie, mostly in eastern Oklahoma but fairly well scattered through the northeastern part of the region. Other fruit crops include strawberries, blackberries, and papayas.

### *The Job*

Requires skill and experience to bring somewhat delicate crops through the year. Disease and weather must be constantly battled. Harvest and marketing must be timed to maximize returns. Growers are less tied down, except during harvest

and spraying, than are other farmers, but the work is quite hard and good supervisory ability is essential at harvest. Daily work requires considerable mechanical aptitude for equipment used and, also, good judgment in timing seasonal operations. Bad investments are exceedingly dangerous in tree-fruit farms, because the cycle of growth covers such a long time.

### *Outlook*

Good opportunities, in areas having favorable soil and climate for well-grounded, well-financed operators. Outside of these areas, many unfavorable production and marketing conditions make it difficult, if not impossible, to operate commercial fruit farms. Demand for fruit is still increasing in this country, but its production is difficult and marketing is highly competitive.



## Oklahoma and Texas—Peanut and Pecan Farms

Peanuts have been widely grown on the light sandy lands of the prairies and timbered lands of Texas and Oklahoma. During the war and, also, periods of cotton depression (price and boll weevil), peanuts received quite an impetus as a competing crop for cotton. Most commonly they are grown on cotton or cotton-livestock farms. Spanish varieties are used. Peanut hay is usually fed to livestock.

Pecan orchards are scattered through northeast Texas. They are usually only one enterprise on fairly large farms growing cotton, corn, and peanuts.

### *The Job*

Much of the commercial peanut cultivation in

these States has been mechanized. Future prospects are for more mechanical aids. Yields, however, are considerably lower than in the Southeast. These crops require a high degree of skill and experience in production methods. The high-value and price-for-quality characteristics of these crops make it desirable that the operator have good knowledge and working experience in their culture.

### *Outlook*

Present experiments in mechanized production will make peanuts a more favorable crop in this region, but soil and erosion control is necessary for permanent farming.

## Oklahoma and Texas—Poultry Farms

Much of the poultry in this region is not produced on specialized poultry farms. Farm flocks are most typical in this region. However, commercial poultry has been increasing in recent years. A family broiler enterprise involves raising from 5,000 to 25,000 chicks to about 3 months of age. Started at different times of the year, such an enterprise is a full-time job. Farms of this type are a recent development in southeast Texas and northeast Oklahoma. More investment is required but more stable incomes are received from a broiler-layer combination in which 1,500 to 2,500 birds are housed for egg production. A few such combinations are successfully operated in suburban areas. A big share of the poultry is in small flocks on crop farms. Turkey units are located in the prairie and timbered areas of both States, often a part of grain or general farming.

### *The Job*

The work is quite specialized. Certain chores, such as gathering eggs, feeding, watering, and

cleaning, must be done every day. Seasonally, houses must be disinfected, birds killed and marketed or separated for sale, and repairs to equipment made. Some of this is hard physically; much is monotonous. Mechanical aptitude is not so important as on farms with much field work, but good management and planning are.

Cleanliness is unusually important in poultry farming. High mortality, particularly among grown birds, can very quickly wipe out a year's profits. Among the best protections against disease and cleanliness, knowledge of diseases and their remedies, and establishment of disease-free stock.

### *Outlook*

Increases in per capita consumption of poultry and eggs are expected to furnish good markets. Poultry production, particularly broilers and turkeys, should increase because of recent improvements in production techniques and small acreages needed for poultry.

## Oklahoma and Texas—Vegetable Farms

Texas, one of the largest commercial vegetable States, grows both early and late vegetables. Vegetables are produced in the eastern part of this region, but much of the production is for home use. One or two vegetables are often rotated in the cotton-peanut area as an additional cash enterprise. Intensive commercial vegetable farms of 30 acres and up are found in definite areas. These are parts of the Rio Grande Plains, the Lower Rio Grande Valley, Corpus Christi, Houston, northeast Texas, Tulsa, Oklahoma City, and to some extent eastern Oklahoma. Most cities in the humid areas have a few surrounding market garden farms.

All these areas produce tomatoes, watermelons, melons, and dry onions. Green and snap beans, spinach, carrots, beets, and cabbage are grown in the lower valley and plains of the Rio Grande. Corpus Christi has large acreages of cucumbers, beets, cabbage, and spinach. The Houston and Tulsa areas have cabbage, spinach, and sweet corn. Other vegetables include limas, broccoli, lettuce, peas, peppers, squash, turnips, and radishes. Melons and sweetpotatoes are widely raised

for home use and for sale. Irish potatoes are grown only in the more humid eastern areas, and large acreages are uncommon.

### *The Job*

Requires long hours of hard physical work in the field and in the packing house. The family works, but the operator must also be a good hirer and supervisor of seasonal help, mostly "stoop" laborers. Planning lay-out for the year, to prevent impossible seasonal labor peaks at harvest and to maximize returns by "hitting the market," pays high dividends and requires both good judgment and managing ability.

### *Outlook*

Early market and specialty or high-quality trade offer good opportunities for energetic operators. Market gardens are stabilizing around larger cities. New processing and production methods favor continued increases in units larger and more expensive than those discussed here, with some possibility of cooperative plants buying from smaller farms.

## Oklahoma and Texas—Part-Time Farms

There are large and small part-time units in this region. Some suburban units from 1 to 50 acres have a garden, cow, pig, and chickens as the source of family food and some cash. Small retail routes to dispose of excess produce are not uncommon.

Another kind of operation is the small commercial unit, usually grain, found most often in the wheat areas. Some operators own or lease 160 to 320 acres of cropland with a few buildings and occasionally no equipment. For example, a small-business man in a small town may seed 160 acres of wheat, return to town and wait for the harvest. If it "hits," he has a substantial addition to his cash income. If it does not, he has lost but little.

### *The Job*

Fairly light work of a wide variety is customary. None of this is too demanding on the oper-

ator, whose main purpose is to add to his real income by well-directed use of spare time. As the operator usually hires most of his work done, his problem is largely supervision and waiting.

### *Outlook*

More part-time units will be added to the area as workweeks are reduced, submarginal farms fail as commercial units, and pensioners find suitable locations. Successful ones will continue to be numerous and will be operated by families which have bought within the limits of their resources and which plan to operate within the limits of their ability, both physical and financial. Small cash grain or range livestock units may become more numerous as supplements to pensions and annuities.

## NORTHERN PLAINS STATES

### Northern Plains States—Cash Grain Farms

This is one of the most fully mechanized types of farms. Those of family size vary from 320 to over 1,200 acres, but about 480 acres are the minimum necessary to provide an adequate level of living for a farm family in the wheat areas. Wheat is the main crop; winter wheat in the southern area and spring wheat in most of the north. Corn, oats, barley, and rye are also widely grown and in some parts of the region one or more of these alternative crops may be more profitable than wheat. Flax is raised in the north, especially along the eastern border of the Dakotas. Wheat-livestock combinations are more common in the northern area, wheat-fallow or wheat-grain sorghums in the south.

Low rainfall of the western part limits dry-land farms to hardy small grains—largely wheat, barley, and rye. Summer fallow tends to stabilize production. Livestock is often kept especially in the northern areas. In the winter-wheat areas sheep and cattle are fed as a complementary enterprise using wheat pasture. Steady increase in acreage has accompanied mechanization, mostly in the past 25 years. Today the more successful dry-land farmers operate 800 to 1,200 or more acres.

Wheat-corn combinations on smaller acreages are found on the more humid and better protected soils of the eastern portion. Wheat-grain sorghum combinations have developed in southwest Kansas and adjacent areas.

#### *The Job*

It requires an active, resourceful man, who can do a variety of jobs with at least average skill. Mechanical aptitude is necessary because the combine-harvester, truck, tractor, drill, and other field equipment must be kept in operating condition. Availability of working equipment, when needed, is vital on these highly mechanized farms. An understanding of livestock is desirable.

#### *Outlook*

This region contains some of the best wheat land in the world. Although wheat has been a surplus crop, large acreages will continue to be grown. With sufficiently large well-operated acreage, farmers can provide their families with an adequate living in all but drought years.

### Northern Plains States—Cash Grain-Livestock Farms

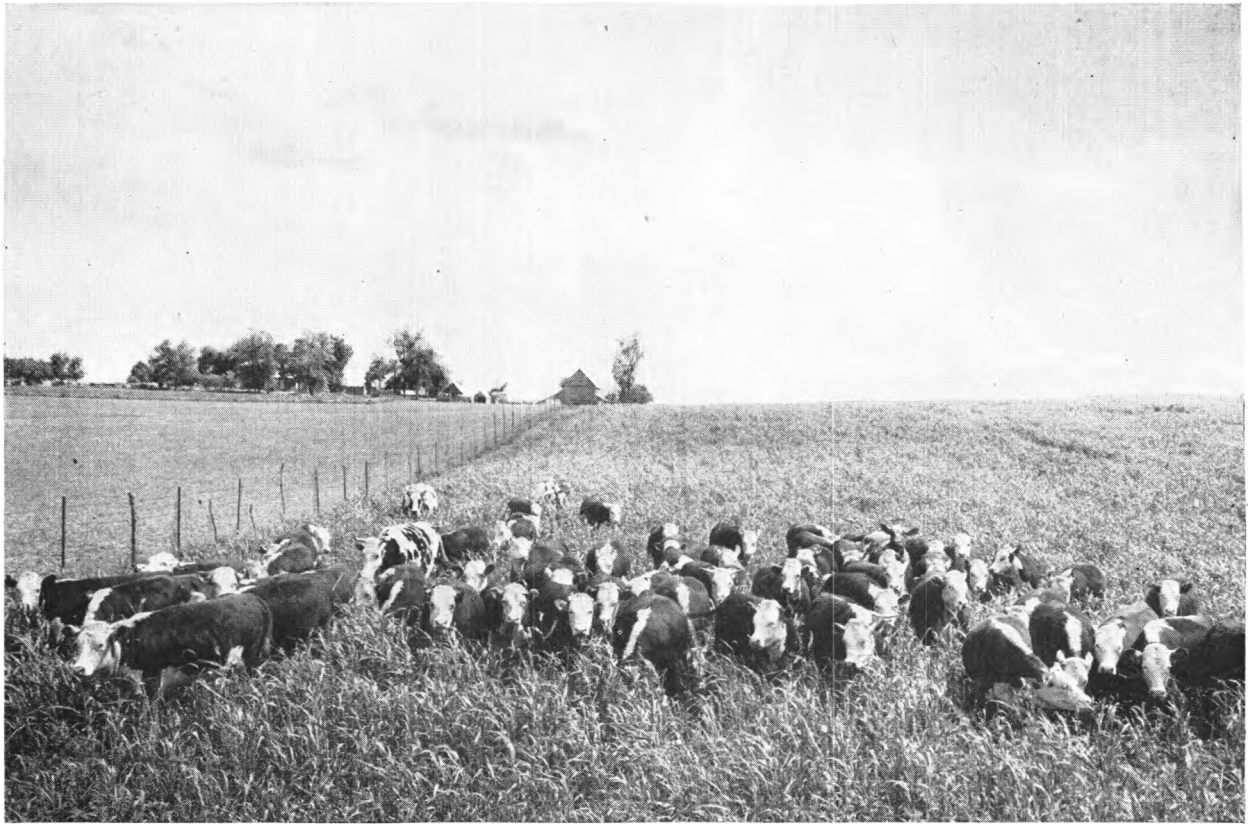
This is the Plains version of a Corn Belt prairie farm. Range from 400 to 2,500 acres; the larger units with cattle more common in the western plains, and the smaller units with hogs more general in the east. Where soil and rainfall are consistently favorable, a wheat-corn-hog-beef cattle combination gives diversity and fairly high income. These units feed out the livestock or cut back on stock and sell their grain in accordance with their immediately best opportunities. Hay crops and rotation pasture are a permanent part of the farm plan.

Farther west, there is more wheat and barley, but less corn. Hogs are fewer and cattle and sheep more common. More of the cattle are raised

rather than bought as feeders. Dairy cattle, which are fairly common in the Eastern Plains, give way to dual-purpose or beef types.

#### *The Job*

It requires more management skill and more year-round work than specialized cash grain farming. Mechanical aptitude is necessary for operating combines, tractors, and a variety of field equipment. Knowledge of livestock management is essential. Maintaining highest profit combination of grain and livestock sales requires a high degree of managerial skill. Work is more continuous and operators have less leisure time than strictly cash grain farmers.



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A bunch of Hereford yearlings running knee deep in Sudan grass in the eastern Plains.

### *Outlook*

Addition of livestock to cash grain units gives more profitable employment to the operator and greater diversified outlet for his products. An-

nual fluctuation of income will be less than on specialized cash grain units. Well bought units of this type offer good opportunities to industrious intelligent operators.

## Northern Plains States—Range Livestock Farms

Range livestock farms are a fairly limited type of operation. They usually have from 125 to 400 or more cattle and from 750 to 2,000 or more sheep. Cattle units are more common and are concentrated in the Sand Hills of Nebraska and the Black Hills of South Dakota.

Acreage owned includes the ranch headquarters, with hay and a little grain the only crops harvested. Much of the hay is wild. Cattle are grazed over some of the owned acreage and over a larger area leased or held in State and Federal

grazing districts. Indian lands may also be grazed under lease. On some ranches, small acreages of irrigated land help furnish the wintering roughages. On ranches with good wheat land, this grain offers additional cash income to the operator.

Livestock is sold as feeders or grass-fat cattle. Sheep may be sold as feeders or held for partial fattening when surplus grain is available. Unusually high acreages of grazing land and wild hay typify range livestock operating units.

*The Job*

Work is not unusually heavy or monotonous. Management skill and knowledge of livestock is essential both in raising and marketing. If combined with irrigated farming, harder work and still higher degree of managerial skill in planning and operating are required.

*Outlook*

These States with few exceptions are really the fringe of range livestock operations. Well-planned operations can be successful in view of our steadily increasing needs for meat, but location in the Plains should be carefully compared with possibilities farther west.

## Northern Plains States—Dairy Farms

Limited type for this area. Fairly well scattered in the eastern half of this region. Usually they are medium-sized farms, from 160 to 800 acres, whose operators have increased their dairy enterprise at the expense of cash grain and other livestock. Some wheat, corn and oats, hay, and pasture are grown; some sheep or cattle may be fed. Occasionally, these other enterprises may contribute a major part of the income, but, during most years, the dairy enterprise of from 15 to 40 cows is more common. Milk is usually sold on a butterfat basis to creameries and processing plants.

A considerable number of dairies are concentrated near the larger towns and cities, such as Kansas City, Omaha, Lincoln, Sioux Falls, Fargo, Topeka, and Wichita. These dairies sell whole milk under rigid sanitary regulations for fluid use in town. The number of cows milked is higher and more stock feed is both raised and bought on

fluid milk farms, although these may be smaller than the butterfat type.

*The Job*

It requires resourceful operators who have good knowledge of dairy husbandry and can do a variety of jobs with at least average skill. Mechanical aptitude is necessary because a farm truck, tractor, and a considerable quantity of field and barn equipment must be kept in operating condition, and buildings kept in repair. An understanding of livestock characteristics is essential.

*Outlook*

Opportunities are rather limited, except near urban areas in the eastern part. Much of the land is well suited to dairy farm needs and developed markets are available. Experienced operators on the better farms can find profitable year-round employment with relatively low fluctuation of income.

## Northern Plains States—General Farms

General farms are a fairly stable type that offer a maximum of security and employment. They comprise from 160 to 800 acres or more. Income is received from some combination of beef cattle, hogs, sheep, dairy, poultry, small grain, corn, flax, potatoes, sugar beets, or vegetables. Actual combination depends on soil, climate, lay-out of farm, and preference of the operator. Smaller acreages but additional skills are required in the irrigated areas in the western part.

Among the best farms are those of the Red River Valley and the Corn Belt fringe in South Dakota, Nebraska, and Kansas. In the northern

areas, beef cattle or dual purpose, hogs, and sheep are the most common livestock; wheat, barley, and corn for silage are the most common feed crops. Cash crops include potatoes, sugar beets, and flax. In the southern areas, general farms have more corn for grain, more hogs, and fewer sheep, and raise less cash crops and more feed crops.

*The Job*

The operator must be vigorous, resourceful, well-trained, and skilled in management. A wide variety of jobs must be well done or well super-

vised. Some knowledge of production methods and operating problems, such as disease control in cattle, hogs, sheep, and field crops, is necessary.

#### *Outlook*

Good opportunities for profitable farm operations. The better located farms compare favor-

ably with similar units in the Corn Belt States. Planned to give full employment all year and to take advantage of soil and climatic resources, well-managed units should be successful. Their year-to-year variations in income are small compared with other types, although their average income will be lower.

## Northern Plains States—Part-Time Farms

Comparatively few in number, but acreages are considerably higher than those farther east. Vary widely in size and kind. Suburban units from 1 to 50 acres are found around cities of the Eastern Plains with garden, cow, pig, and chickens as the source of family food and a few cash sales. Small retail routes offer outlets for some operators.

Another kind is the small commercial unit, usually grain, found most often in the wheat areas. Some operators own or lease 160 to 320 acres of cropland with few buildings and occasionally no equipment. For example, a businessman in a small town may seed 160 acres of wheat, return to town and wait for the harvest. If it "hits," he has a substantial addition to his cash income. If it doesn't, he has lost but little.

#### *The Job*

Work of a wide variety is customary on suburban units. None of this is too demanding on the operator, whose main purpose is to add to his real income by well-directed use of spare time. The part-time grain farmer often hires most of his work done; his problem is largely supervision and waiting.

#### *Outlook*

More part-time farms will be added to the area as workweeks are reduced, submarginal farms fail as commercial units, and pensioners find suitable locations. Units will be operated successfully by families which buy within the limits of their resources and plan to operate within the limits of their ability, both physical and financial.

## MOUNTAIN STATES

### Mountain States—Cash Grain Farms

Cash grain farms are a highly mechanized type, common to only a few areas. They vary from 80 to over 1,200 acres, but about 480 acres is the minimum dry-land acreage likely to bring decent level of living to a family in the wheat area. Wheat alone or with some livestock is most common in the plains of Montana, Wyoming, and Colorado. Wheat and dry peas are the main crops on cash grain farms in northern Idaho and western Montana. Barley and rye are also grown and, in some parts of the region, one or more of these alternative crops may be more profitably grown than wheat. Some flax is grown in Montana. Sorghums are raised largely on the eastern slope of New Mexico and Colorado.

Low rainfall limits dry-land farms to hardy small grains; largely wheat, barley, and rye. Some livestock is often kept, and in some areas sheep and cattle are fed as a complementary enterprise using wheat pasture. Steadily increased acreages have accompanied mechanization, mostly in the past 25 years. Today, the more successful dry-land farmers operate from 800 to 1,200 or more acres.

#### *The Job*

It requires an active, resourceful man who can do a variety of jobs with at least average skill. Mechanical aptitude is necessary because the com-

Hay stackers of various types are found all over the Mountain States. Hay is the supplementary feed that helps carry range cattle through the rough winters of the high west.

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bine-harvester, truck, tractor, drill, and much other field equipment must be kept in operating condition. Availability of working equipment, when needed, is vital on these highly mechanized farms. An understanding of livestock is desirable.

### *Outlook*

Opportunities for dry-land cash grain farms in the best adapted specialized areas are among the best in the country. Relatively, there are fewer cash-grain units than farther east, but, of these few, some are excellent.

## Mountain States—Range Livestock Farms

This region includes the most extensive range area of the country. On ranches the major source of income is from livestock. Large acreages are the rule, and cropland usually is limited to hay and grains for feed production. Principal variations include adaptability of the ranch to cattle or sheep production; number of acres of range necessary for each animal (carrying capacity); length of winter feeding season, which determines amount of hay required per head; winter-feed-producing ability which depends upon acreage adapted to crop production, quality of land and water rights belonging to the property. Few ranchers own all their range-land requirements, so availability of leases or public-land-grazing permits is important. While these are physical factors, each operator makes numerous personal decisions that vary the type of operation.

Class of livestock sold by ranchers depends largely on type of operation for which the ranch is adapted. Relative market price for different classes of livestock determines type of operation at a particular time. Some ranchers sell calves, above heifer replacement needs, at weaning time in the fall. Others hold their calves over, selling them as long yearlings or as 2- or even 3-year-olds. All sell aged or defective cows as culls. While some ranchers produce grass-fat cattle in the more favorable years, most cattle sold from this region go on the market as feeders.

Income from sheep ranches is largely from sale of wool and lambs. Sheep are shorn in the spring or early summer. Lambs are weaned and sold usually as feeders during the period August to October. To replace aged ewes and animals which die, ewe lambs numbering about 20 percent of the total of sheep run are retained each year.

### *The Job*

Occasionally very hard, but probably is more interesting and less arduous than farm work. Management skill and knowledge of livestock are essential both in production and marketing. Irrigation of cropland used adds to managerial problems. Skill in handling stock is essential because low losses and high calf or lamb crops are the major determinants of annual income.

### *Outlook*

Greater meat production will be necessary to meet demands of our steadily increasing population. Wool outlook is less favorable. This region is basic to our livestock industry and offers good opportunities to industrious, intelligent operators. Investment necessary to return adequate income to operators is among the highest. Sufficient financing and unusually thorough training are necessary.



## Mountain States—Irrigated Farms

Irrigated cropland is the major source of income. Usual type has certain specific rotations including alfalfa, small grain (nurse crops), and pasture. Aside from this, most farms have one or more specialty cash crops, developed from a combination of natural advantages and available markets. They vary from 40-acre cash-crop hay units to thousands of acres in long-staple cotton.

Common crop specialties include sugar beets, potatoes, field beans, small grains, and alfalfa. Cotton highly specialized under irrigation is grown only in a few counties along the Pecos, Rio Grande, Yuma, Gila, and Salt Rivers in Arizona and New Mexico. Sugar-beet acreage is concentrated along the Snake River in Idaho, the Plattes in Colorado and Wyoming, the Arkansas in Colorado, and the Yellowstone and Milk Rivers in Montana; also, west of the Wasatch Range in Utah, particularly in the Salt Lake area, and in north-central Wyoming. Potatoes are quite widely grown but have large concentrations on upper and lower Snake River in Idaho, San Luis Valley, and Greeley areas of Colorado. Field beans and alfalfa have been grown in most irrigated areas.

Some livestock is on most irrigated farms, and some farms in beet areas have intensive feeding operations.

### *The Job*

Crop specialties require resourceful, vigorous operators with good training in field work and horticulture. Irrigation adds to the work and complexity of managerial problems. Both gravity and pump irrigation are common to this region.

Hard work is the rule, especially during the growing season. Hay rotations usually bring some livestock into the organization and more year-round work.

### *Outlook*

Prospect for adequate income from hard work is quite good for crop specialty units in this region. Markets are usually good, and production, especially under irrigation, is fairly even year by year. The larger units with reasonable diversification furnish the better farming opportunities in the country.

## Mountain States—Dairy Farms

Many farms have four to six cows and sell a little milk or cream. Larger commercial dairy farms are found mostly near cities and towns requiring fluid milk, such as Butte, Boise, Ogden, Denver, Cheyenne, Albuquerque, and Phoenix. Irrigated hay, feed crops, and pasture are operated with the dairy. However, many large dairies have few crops and buy most of their feed.

A few commercial dairy farms, not primarily concerned with fluid milk markets, are on land that is too thin to be used for cash crops. Units of this type are found on the western slope in Colorado, around Boise, Idaho, and east of Great Salt Lake.

### *The Job*

Requires an active, resourceful man who can do a variety of jobs with at least average skill and who also can do paper and book work necessary for good farm planning. Mechanical aptitude is necessary because a farm truck, tractor, and a considerable quantity of field and farm equipment must be kept in operating condition, and buildings kept in repair. An understanding of livestock is essential.

### *Outlook*

With the exception of local urban markets,

dairy farming in this area is limited to thin lands. Experienced operators can find profitable year-round employment with less fluctuation of income

than on more specialized crop or livestock farms. As an enterprise on irrigated farms, a larger dairy may be developed to use labor and alfalfa.

## Mountain States—Vegetable Farms

A wide variety of fresh vegetables are grown in the irrigated valleys. Commercial vegetable units range from 40 acres upward, with the largest units in the highly commercial valleys of southern Arizona, Salt Lake area, Lower Snake River in western Idaho, and irrigated valleys of Colorado. Many commercial vegetables come from general and crop-specialty farms that have one or two vegetables in their rotation.

Lettuce is concentrated in Yuma and Salt River Valleys of Arizona, San Luis Valley and north-west Colorado, and the Snake-Boise area in Idaho; net and smooth melons along the Arkansas River in southeastern Colorado and in the Salt River Valley near Phoenix, Ariz.; cabbage in the San Luis and Greeley, Colo., areas; peas in these areas plus Salt Lake, Utah, and the Boise-Snake of Idaho; onions along the Arkansas, in San Luis Valley, and on the western slope of Colorado—also the Salt Lake and Boise-Snake areas; hot peppers along the Rio Grande in northern and southern New Mexico. Other vegetables grown to some extent include beans, carrots, cauliflower, celery, sweet corn, and cucumbers.

### *The Job*

Long hours of hard physical work during the growing season are required. The family works, but the operator must also be a good hirer and supervisor of seasonal help, mostly "stoop" laborers. Planning lay-out for the year to prevent impossible seasonal labor peaks at harvest and to maximize returns by "hitting the market," pays high dividends and requires good judgment and managing ability.

### *Outlook*

Out-of-season deals and specialty or high-quality trade offer good opportunities for alert, energetic operators. There also are good prospects for a few market garden units near urban areas. Many commercial vegetable farms offer little more than living to the small operator. New processing and production methods favor continued increases in units, larger and more expensive than those discussed here. These developments also favor increased competition for the West from other commercial vegetable areas.

## Mountain States—Part-Time Farms

Part-time farms are scattered throughout this region. Gardens, beef and dairy cattle, sheep, hogs, chickens, and a very few acres of land are among the enterprises that can be part of such units. A larger acreage with considerable pasture and a few acres in feed crops is also possible, particularly in the foothills where rainfall is heavier.

Actual enterprises followed usually reflect soil resources of the farm and desires of the operator. Some don't like livestock and have none. Some have seasonable jobs, which allow time for a small market garden. Others, with large units, have cattle or sheep that are pastured but fed on feed and hay bought from the outside.

### *The Job*

Fairly light work of a wide variety is customary. None of this is too demanding on the operator, whose main purpose is to add to his real income by well-directed use of spare time.

### *Outlook*

More units will be added to the area as work-weeks are reduced, submarginal farms fail as commercial units, pensioners find suitable locations, and urban people indulge their back-to-the-farm urge. Successful ones will be operated by families which buy within the limits of their resources and operate within the limits of their ability, both physical and financial.

## PACIFIC STATES

### Pacific States—Fruit Farms

In parts of California and some of the irrigated valleys of Oregon and Washington, fruit farms dominate the agricultural economy. Most are on irrigated land, so family units are relatively small, from 15 to 50 acres. Oranges are concentrated in the southern San Joaquin Valley and on the south coast of California; lemons on the south coast, and grapefruit in the Imperial Valley and south coast. Deciduous fruits are more widely grown, for there are numerous areas where soil, climate, and topography favor peaches, apples, pears, cherries, and the various berries. However, apples are concentrated in the Yakima and Wenatchee-Okanogan areas of Washington, the Hood River district of Oregon, and on the central coast of California. Walnuts are centered in the Central Valley and south coast of California and the Willamette Valley regions of Oregon. Almonds are a California specialty, although grown to some extent in Oregon.

There are numerous other specialty areas. Dates are found only in the Imperial and Coachella Valleys. Pears are grown in several valley and foothill regions in California, in Hood River and Rouge River Valleys in Oregon, and in the Yakima Valley in Washington. Table, raisin, and wine grapes are specialized almost entirely in central California. As for figs, olives, plums, prunes, apricots, and peaches, each has regions where conditions are favorable. Briefly, this is a fruit region with a tremendous range in latitude and altitude.

#### *The Job*

Requires skill and experience to bring somewhat delicate crops to harvest and market. Disease and weather must be constantly battled. Harvest and marketing must be timed to maximize returns. Fruit farmers have quite a bit of seasonal work, much of it is hard. Good supervisory ability is essential at harvest. Daily work requires considerable mechanical aptitude in caring for equipment used and, also, good judgment in timing seasonal operations. Investments should be made very carefully, because the cycle of growth covers such a long time. Due to this danger and because of soil and topographical limits of fruit farming, purchases should be most cautiously made.

#### *Outlook*

Good opportunities in favorable areas for well-grounded, well-financed operators. Outside of the better areas, unfavorable production and marketing conditions are likely to force continuation of recent decline and the continued adoption of a less specialized combination of enterprises. There is less opportunity than with most other types of farming for expanding total production because overproduction and low prices may quickly occur. Outlook for future profits varies widely with different fruits, so the prospective fruit grower must look carefully into prospects for fruit under consideration.

### Pacific States—Vegetable Farms

This region has several outstanding vegetable areas, largely under irrigation. Large-scale specialized operations are typical of commercial vegetable production, especially in California. Grower-shippers may, however, rent units of 20 to 50 acres to producers, whose main job is to get crops ready for harvest. Small-scale producers should be sure of a market outlet for their prod-

ucts. In irrigated areas of Washington and in the Willamette Valley of Oregon, there are also small owner-operated units. There are relatively few market gardens in the region.

Main vegetable producing areas are Spokane, Walla Walla, Yakima, and Puget Sound of Washington and the Willamette Valley; and, for green peas, Umatilla of Oregon; the Sacramento, San



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Picking strawberries is a tedious job for the worker. For the operator, it is his annual pay-off and requires managerial skill of the highest degree.

Joaquin, and Imperial Valleys; and the central and south coast of California.

Among the more heavily grown crops are lettuce, tomatoes, green peas, celery, onions, artichokes, asparagus, green beans, melons, carrots, and sweet corn. Other vegetables include beets, broccoli, cabbage, cauliflower, brussels sprouts, cucumbers, peppers, spinach, squash, watermelons, and rhubarb. Many lesser known and a few exotic vegetables are grown particularly in southern California.

### *The Job*

It requires long hours of hard physical work in the field, in the packing house, and sometimes in the market. Operator must be a good hirer and supervisor of seasonal help, mostly unskilled or semiskilled laborers. Planning lay-out for the year, to prevent extreme seasonal labor peaks at

harvest and to maximize returns by "hitting the market" pays high dividends. Picking at the right time or, occasionally, plowing a crop under and replanting require good judgment and managing ability. Knowledge of horticulture, experience in its practical application, and smart market sense are very essential in this highly competitive business.

### *Outlook*

Good opportunities in this region for energetic, skillful operators. While it is difficult to get in on a family scale, there are prospects for good living to the small operator. New processing and production methods favor continued increases in units larger and more expensive than those discussed here. However, the smaller ones are favored in new and old irrigation developments under Government regulations.

## Pacific States—Irrigated Farms

In value of products, irrigated cropland is predominant in this region. Much of this land is in a combination of crop specialties, field crops, and livestock. Units of from 20 to 120 acres are quite common in the Yakima, San Joaquin, Sacramento, Imperial, and smaller valleys. These units have some combinations of fruit, vegetables, dairy, poultry, beef, pasture, alfalfa, sugar beets, potatoes, and specialty crops.

Actual combination varies with soil, climate, inclination of operator, and availability of markets. Vegetables, alfalfa, and sugar beets are usually grown for predetermined markets or under contract with processors or dealers. For example, Imperial Valley alfalfa is sold largely to dealers or large dairies with dry-lot operations in the Los Angeles area. Usually, alfalfa, small-grain nurse crops, and some pasture are parts of irrigated rotation, and specialties are developed in line with soil, climate, and markets.

Specialized units include cotton, potato, alfalfa, and sugar beet. Most cotton units are located in the San Joaquin and Palo Verde Valleys. These are all irrigated areas; high per acre and per farm production is the rule, much of it under contract.

Potato farms are found in both irrigated and dry-land areas. Most recent development has been expansion of the early potato acreage in Kern County, Calif. Potatoes are important in Klam-

ath and Deschutes Counties of Oregon and, as a high-altitude crop, are one of the best cash crops in the Cascade foothills. Specialized potato units in the Yakima or Willamette areas are not common, but a few units are always found wherever the potato is a prominent cash enterprise.

### *The Job*

Operator must be resourceful, well-trained, and skilled in management. A wide variety of jobs must be well done or well supervised. Some knowledge of production methods and operating problems, such as disease control in cattle, poultry, sheep, fruit, vegetables, and field crops, is necessary. Skill in irrigation or a business large enough to hire such skill is essential.

### *Outlook*

Good opportunities at rather high investment levels for profitable farm operation. Irrigated units, which are basic to the industry and well-being of the area, have a definitely good future. Some specialties, such as fruit and cotton, are less desirable immediate prospects because of high investments and uncertain prices. Well-managed, well-financed units, having considerable flexibility in production possibilities, should be sound investments.

## Pacific States—Range Livestock Farms

Range areas are similar to the intermountain area to the east. Ranches have livestock, sheep, or cattle, as the major source of income. Operating acreages are large and there is relatively little cropland. Ranchers in this region usually own a higher proportion of total land operated than do intermountain ranchers. This is particularly true where per acre carrying capacity is high.

The nature of cattle and sheep operations varies widely with the kind of range and supplemental

feed available. Some ranchers operate breeding herds and sell feeder cattle, calves and steers, or lambs. Others on better ranges, can market grass-fat cattle. Some may buy feed and sell finished stock. Still others may buy feeders for partial finishing and resell them in the fall. Sheep ranchers sell early or late lambs (the former being very common in California), mutton, and wool. Lambs may be sold as feeders or fat.

*The Job*

Ranching is occasionally hard, particularly during lambing or emergency winter feeding. However, to many people, it is more interesting and less arduous than farming. Management skill and knowledge are essential both in production and marketing. In some areas, irrigation both of pasture and cropland adds to managerial problems. Skill in handling stock is essential because low losses and high calf or lamb crops are major determinants of income.

*Outlook*

Increase in meat consumption during the war and the marked growth in population on the Pacific coast indicate that greater meat production is desirable. This region has several excellent range livestock areas, and cut-over land offers limited new possibilities where development costs are reasonable. Wool prospects are less promising than meat. Difficulty in the stock business is not in poor future earnings but rather in the fact that range facilities in the West are already fully utilized and allotted to existing ranchers.

## Pacific States—Cash Grain Farms

This region has some of the best small-grain areas of the country. Wheat, rice, oats, barley, flax, dry peas, and field beans are the most important crops. Rice is limited by soil largely to the Sacramento Valley; flax to San Joaquin and Imperial Valleys. Wheat production is most concentrated in the Palouse-Big Bend of eastern Washington and Oregon. Peas are grown in rotation in parts of the Palouse. Small grains are widely raised as a nurse crop in irrigated areas.

There are important variations in size of farms. Adequate units need at least 80 acres irrigated or 800 dry-land, but irrigated ones have from 40 to 160 acres, dry-land units from 160 to 2,500 acres or more. There are numerous inadequate-sized dry-land units in both the wheat-peas and wheat-fallow areas. Successful sizes also vary widely with rainfall, which has an average range in this region from 9 to 70 inches, and higher in isolated mountain areas.

Some carry a substantial livestock enterprise. Cattle, both beef and dairy, sheep, and poultry are effectively combined with grain and add to income

at small cost, as stubble, hay, and grazing are given their most profitable employment.

*The Job*

Requires an active, resourceful man who can do a variety of jobs with at least average skill and, also, paper work necessary for good farm planning. Mechanical aptitude is very necessary because the combine-harvester, picker, truck, tractor, drill, and a wide variety of other field equipment must be kept in operating condition. Availability of working equipment, when needed, is vital on these highly mechanized farms. An understanding of livestock is desirable.

*Outlook*

This region contains some of our best cash grain land. Although some cash grains, especially wheat, have been surplus crops, large acreages will continue to be grown. With sufficient well-operated acreage, farmers can usually provide their families with an adequate living.

## Pacific States—Dairy Farms

Dairy farms in these States are of two distinct kinds, depending on the type of market outlets. Near urban areas, farms are more expensive, have a large number of cows, but are not necessarily larger in acreage; whole milk is sold to city dealers

or retailed at relatively high prices but under stringent sanitation regulations. These fluid milk farms are all over the area, but are numerous in the Los Angeles, San Diego, San Francisco, Portland, Puget Sound, and other milksheds. The

second marketing type, under high but less stringent sanitation regulations, sells milk or butterfat to manufacturing plants where it is processed into evaporated milk, cheese, butter, and other milk products. This type is most numerous in western Oregon and Washington, where the number of cows is small.

Many are not specialized, but depend for some income on cash crops and other livestock products. Of these, fruits, poultry, and vegetables are most common. Grain and hay are sold in some instances. Each of these assists in building up farm income and adds to the profitable employment of farm resources. Size of unit varies from 20 to over 500 acres, depending on number of cows, kind of operation, and extent of irrigation. Where dairying is the only source of income, 15 to 20 cows with the required feed land is about the minimum satisfactory size.

#### *The Job*

Requires an active, resourceful man who can do

a variety of jobs with at least average skill and, also, paper and book work necessary for good farm planning. Mechanical aptitude is necessary because a milking machine, farm truck, light tractor, mower, rake, sprayer, and other field equipment must be kept in operating condition, and buildings kept in repair. An understanding of livestock characteristics is essential. Irrigated units demand added skills in the use of water. Dairying requires twice-a-day milking and feeding every day of the year.

#### *Outlook*

It has a good future. Much of the land to be developed by irrigation is well suited to dairy farms, and some of it is poorly adapted to anything else. Developed markets are available. Experienced operators on the better properties can find profitable year-round employment with less fluctuation of income than on more specialized crop or fruit farms.

## Pacific States—Poultry Farms

This is an important egg-producing region with some highly specialized poultry farms. Small specialized chicken-egg farms are fairly well scattered throughout California, though more common in the coastal half of the State. This is still more true in Oregon and Washington, where most poultry farms lie between the Cascade and Coast ranges.

Adequate family units should have from 1,500 to 2,500 laying birds, which amounts require raising from 3,500 to 8,000 chicks. Meat sold is from culls and cockerels. Turkey and broiler units, which specialize in meat production, may raise from 1,000 turkeys to 25,000 broilers. Early development of egg marketing associations, selling on eastern markets, has resulted in more emphasis on eggs than meat, but broilers and turkeys have increased considerably in the past 15 years.

#### *The Job*

Work is more specialized than dairy or general farming. Certain chores, such as gathering eggs, feeding, watering, and picking up sick birds, must

be done every day. Seasonally, houses must be cleaned and disinfected, chicks brooded, birds killed and marketed, and repairs made. Mechanical aptitude is not so important as on farms with much field work, but good management and planning are.

Sanitation is unusually important, as high mortality can very quickly wipe out a year's profits. Among the best protections against disease are cleanliness, knowledge of diseases and their remedies, and establishment of disease-free stock.

#### *Outlook*

Poultry farming in the West, if properly located as to feed supply and markets, can hold its own in competition with other regions. The long-time outlook is fairly good, but the poultry business is one that frequently becomes overexpanded and resulting prices drop too low for any but the better producers to make a profit. But weaker ones are soon eliminated and profitable prices return within a year or two. The beginner will do well to time his entry into the business just before one of these profitable years rather than just after.

## Pacific States—Part-Time Farms

There is an unusually large proportion of part-time units. These units, whether they be cut-over poultry farms or 5 acres of oranges, have one thing in common. They are too small to produce an adequate living. Only a few exceptional units, started on a part-time basis, can be expanded into a full-time family farm. These are the exceptions.

Units are numerous in this region for several reasons, but mainly because the climate has attracted many retired couples and because too many units were established with less land and equipment than is now necessary for full-time operation. They are located in all areas, though most common in valleys near larger cities and in foothills, particularly of the coastal range. Perhaps the most advertised areas are southern California and Puget Sound, and each of these has its quota.

Because of marketing and production difficulties, some enterprises are not well suited to part-time operation. However, there is a definite place for units with enterprises such as fruit, vegetables, poultry, flowers, and rabbits. Fairly large fruit units are part time because much of the work is done by contract. Subsistence units, from which

milk, eggs, and garden products are produced for home use only, are more numerous than farms designed solely to add to family cash income.

### *The job*

Fairly light work of a wide variety is customary on a part-time unit. Although much of this is hand work, due to absence of commercial farm equipment, little of it is too demanding on the operator, whose main purpose is to add to his real income by well directed use of spare time.

### *Outlook*

More units can be expected as workweeks are reduced, submarginal farms fail as commercial units, pensioners find suitable locations, and urban people indulge their back-to-the-farm urge. Successful ones will be those operated by families which buy within the limits of their resources and operate within limits of their ability, both physical and financial. However, the cow-chicken-garden units for family use only will continue to be numerous as enterprising families try to stretch meager incomes to meet their family needs.



## *Farm Service Jobs*

In almost every farming community there are various jobs and services which farmers want done and are willing to pay for. Some of these call for considerable skill and experience, some can be done with almost no previous training. Some require expensive equipment, others virtually none. Such jobs can sometimes be combined well with a small part-time farm, or can be done to piece out the income of a man living in a village and engaged part time in other work.

### *Whitewashing Service*

In the dairy and poultry regions particularly, the necessity for keeping the interior of stables and chicken houses whitewashed makes a year-round job for a whitewashing outfit. This necessitates a light truck with spray rig large enough to do this kind of work. One man sometimes does the job; occasionally there is work enough to keep two men busy. In the ordinary course, such a whitewashing outfit will have a regular route, which covers a large number of farms and goes back over the same route perhaps once in 3 months. In most market milk areas in the North and East, the sanitary regulations require this whitewashing of cow stables. Ordinarily the farmer pays so much for the job, possibly \$5 to \$20, depending upon the size of the buildings. An outfit can usually do several jobs in a day.

### *Feed Grinding*

The mobile feed-grinding outfit offers a year-round job in dairy and livestock regions. The outfit consists of a light truck equipped with a gasoline engine and feed grinder. Some go to farms on call while others maintain a regular route, planned to arrive at certain farms on certain days. In either case, the farmer will have his grist ready and the grinding is done with a minimum of time lost on the part of the outfit. Several farms are visited in one day. The grinder is usually paid so much per hundred pounds of grain. Some feed grinders also add a skilled mixing service and are

prepared to mix balanced rations to the farmer's order, in some cases adding the necessary protein concentrates which are carried in the truck.

In parts of the South and elsewhere the grain-grinding outfit may be in a fixed location, perhaps run in connection with a store or garage, and farmers take their grain to it.

### *Fruit Spraying*

In the orchard sections, such as Wenatchee and Hood River Valleys of the Northwest, or in California, or in the Shenandoah and Hudson Valleys of the East, and other notable fruit sections, there is a fruit-spraying job which may occupy a man with a mobile spraying outfit several months of the year. The equipment is usually a light truck with a good spray rig, which will reach to the height of fruit trees. One man can operate such a rig, with the help of the grower who employs him. Two men often own and operate together. The spray outfit goes from orchard to orchard, usually on a fairly regular route, and is paid either by the job or so much per tree, or in some cases is paid by the season to keep the orchard properly sprayed.

### *Fruit Caretaker Service*

In the citrus fruit regions a more elaborate caretaker service will occasionally be found. Some of these are quite extensive organizations having tractors and all kinds of heavy tillage and spraying machinery and employing a force of men. For a fee they will take entire care of an orange or grapefruit grove—tillage, pruning, spraying, some even going so far as to pick and market the fruit.

### *Grain Elevator Jobs*

Throughout the grain-growing regions of the Midwest, country elevators are always in need of managers and workers. The job as an elevator man does not need a great deal of training, but does require a background knowledge of grain and the handling thereof, together with some un-

derstanding of how the railroads and markets operate.

### *Mobile Blacksmith Shop*

In regions where blacksmith shops have disappeared, the mobile blacksmith job offers a good living to a man who knows how to shoe horses and do ordinary rough work with metals. The outfit usually consists of an old car or light truck with rear end equipped with a forge, anvil, and space for necessary tools and fuel. With such an outfit, a man can cover a wide range of territory, sometimes parts of more than one State. In regions where there are good-sized stables of horses a few such stables together with the local farm work will keep a man busy the year round. Such blacksmith now get from \$2 to \$6 per horse for a complete shoeing job, rates varying widely in different parts of the country.

### *Garage and Repair Shop*

The country garage and farm-machinery repair shop is a profitable enterprise in almost every part of the country. Of course, this requires some capital, either owned or borrowed—enough to buy or rent a building, acquire necessary tools and enough stock and parts to do ordinary repair jobs. The equipment does not have to be elaborate to start with, but does need to cover the usual small tools. Probably \$1,000 to \$2,000 would be necessary, in addition to the building and a car or truck. There is no lack of work in this field. Most garages and repair shops of this kind have a waiting list of cars, tractors, and farm machines in for repairs. Some such places are able to add to their business by getting an agency for farm machinery, fertilizer, or other such items.

*See also Automobile Mechanics, page 198.*

### *Electrical Service*

For the electrician there is a year-round job in certain rural areas doing electrical wiring, repair work, radio repair, and the like. Usually the electrical-service man will live in a village or on a small farm and do work both in his village and in the surrounding farm territory. Such a job requires a car and usually also means a little shop at home with ordinary repair tools and a small stock of wire, fixtures, radio parts, and other supplies.

*See also Electricians (Construction), page 181; Electrical Repairmen, page 207; and Radio Servicemen, page 210.*

### *Artificial Insemination*

The comparatively new field of artificial insemination, in the dairy regions, has opened up new jobs which a man can fill with very short training. Usually a group of owners of a particular breed of cows will organize an association and buy one or more purebred bulls of that breed. The bull is kept in some central place and when a cow is to be bred on any of the farms in the organization, the farmer telephones to the inseminator who takes semen to the farm and the cow is artificially bred. This work of handling the bull and the breeding operations was formerly done by veterinarians, but now much of it is done by young men who have had short training for the job. It is a steady, salaried job, and pays a comfortable living.

### *Cow Testers*

Wherever there is an organized cow-testing association there is a job for one or more herd testers. The tester is employed by the association of dairy farmers. He has a fixed route, visiting each of the farms once a month. He goes to a given farm, usually spending a day there, or if the herd is large he may have to spend 2 days. He weighs the milk from each cow, tests it for butterfat, weighs the feed fed to each cow and computes its cost. He then makes out a report for the farmer, showing the pounds of milk and fat produced by each cow and the amount and cost of feed. He is paid on a basis which gives him a salary of \$100 to \$200 a month, the lower salaries being in addition to room and board. The herd tester usually lives conveniently somewhere in the area of his work (which is usually inside one county). In most cases, he must have a car.

### *Carpenters*

Country carpenters are in great demand almost everywhere. A man who owns a kit of carpenter tools and knows how to use them can keep busy the year round at building and repair work in farm areas. The country carpenter does not need to be an expert cabinetmaker, by any means. He does need to know the rudiments of framing and

construction, be able to lay out foundations, walls, roofs, and be able to tackle practical repair jobs. At present there is a tremendous backlog of repair and new construction work to be done on farm buildings. This offers well-paying jobs to men who have reasonable skill at carpentry work.

Men with moderate craft skills sometimes vary the carpenter's job with special work in slack season, turning out such products as ladders, potato crates, fruit baskets, etc. Of course, there is also a steady demand in the country for masons.

*See also* Carpenters, page 175.

### *Mobile Repair Shop*

The mobile repair shop makes a year-round job in some farm regions, especially in the Midwest. This outfit usually consists of a covered truck, its interior equipped with tools for both metal and woodwork. It must have a forge as well as ordinary bench equipment and supplies. These mobile repair trucks will stop at a farm or come on call and fix anything from a broken plow handle to a heavy tractor. Some of these outfits furnish a good income to the owner, but an investment of \$1,000 to \$3,000 is necessary in the essential equipment.

A variation is the mobile welding outfit, sometimes operated virtually as a business by itself, in conjunction with a welding shop in town, or it may be a part of the general repair business.

### *Custom Machine Work*

Custom machine work of various kinds provides jobs for many men, often part-time work for farmers or their sons. Such work includes threshing, trucking, combining, tractor plowing, hay and straw baling, potato digging, spraying, terracing, etc. Ordinarily, a man will own (or sometimes rent) the threshing machine, combine, truck, or whatever machine he uses for such custom work. He will go from farm to farm doing the job, usually having a list of jobs scheduled ahead. A great deal of trucking especially is now done on a custom basis; the trucker will haul farm produce to market, sometimes a considerable distance, and return loads of fertilizer, feed, coal, or other supplies to the farms. Nearly all of this custom work pays well, but means an investment in the one or more machines used.

### *Livestock Trucking*

One specialized trucking job in livestock regions is that of transporting horses, cattle, or smaller animals. This livestock trucking is something of a specialized job and requires a truck with body especially fitted to handle big animals. It provides virtually a year-round job in certain regions.

### *Recreation Jobs*

In the North and West, around the Gulf, and elsewhere where recreation areas are popular, there are seasonal jobs as guides, camping experts, or recreation leaders of various kinds. Hundreds of men are so employed from the beginning of the spring fishing season to the close of fall hunting, many of these men being part-time farmers or sons of local farmers or ranchers. This will loom larger as a profitable job, as the 5-day week and more automobiles make it possible for many more people to indulge their love for outdoor recreation. For some such jobs a man needs nothing more than expert knowledge of the region and skill in outdoor matters; in other cases one may own or lease considerable equipment, including boats, horses, guns, fishing tackle.

### *Well Drilling*

Well drilling is a part-time job in many farming regions. In some places it keeps a man busy 8 or 9 months of the year. It requires some knowledge and experience of the work, and for deep wells, equipment consisting at least of a tractor and a derrick or drilling rig, plus some tools and supplies. Ordinarily the driller gets so much a foot, this fee varying widely in different parts of the country and depending on the nature of the soil and depth and character of the well. Of course the owner supplies the pipe and often help and services of various kinds. For a well of a hundred foot depth, the driller may thus get from \$300 up, and in a good season may take in several thousand dollars.

### *Airplane Dusting of Crops*

Airplane dusting for insect control is a growing practice in certain cotton, truck crop, and orchard regions. It may have large future possibilities. Manifestly, this work can only be done by a man who owns or can get the use of a plane equipped

with dusting apparatus. It offers paying sideline work for some young pilots who are undertaking airplane enterprises of one kind or another.

*See also* Airplane Pilots, page 92.

### *Mobile Grocery Store*

The mobile grocery store is an established institution in many farm sections, providing a good income the year-round for the merchant. This enterprise requires a covered truck, equipped for carrying all kinds of groceries, often including refrigerator, plus some kind of store or warehouse building in town to serve as a base of operations. The traveling store covers fixed routes each day, sometimes making the same route twice a week or sometimes only once. No great amount of experience is necessary, although the project will be more successful in proportion as the merchant has a working knowledge of the peculiar needs of his customers, and likewise has profitable outlets for the eggs, furs, butter, honey, or other farm produce which he will often have to or want to take in exchange.

### *Chick Hatchery*

Commercial hatching of chicks has now become a regular business. It is done on a large scale in some places, but can also be done in a small way as a sideline. The equipment necessary is an outbuilding or dry basement, incubators (usually electric), plus the necessary access both to a supply of fertile eggs and market for the chicks.

### *Small Poultry-Dressing Plant*

In the poultry-raising regions the small killing and dressing plant can often find a profitable place. Almost any old barn or building can be used, subject to local sanitary regulations. The work requires only small experience and may pay fairly well as a side-line job.

### *Country Butcher*

In livestock and poultry regions there is usually some man in every community who makes a part-time or more or less year-round job of slaughtering and allied work and who makes a considerable part of his living thereby. He goes from farm to farm on call; depending on the season, he may be called to butcher hogs, veal calves, or cattle, or possibly to caponize a flock of cockerels, castrate some pigs,

"float" (file) a horse's teeth, shear a flock of sheep, or do other jobs relating to the livestock. He does not have to have much equipment other than a few knives, meat saw, and the like, but must have skill in sticking a hog, skinning and dressing meat animals, caponizing, and a general know-how in handling animals.

*See also* Meat Cutters, page 355.

### *Sheep Shearing*

Sheep shearing makes a seasonal job—6 to 8 weeks—in central and western sheep-growing regions. The only equipment required is a pair of good sheep shears, plus means of transportation. Usually a farm or ranch keeping any number of sheep will have power clippers, and in the West frequently shearing machines. Good shearers make up to \$25 a week.

### *Salesman of Farm Supplies*

In some active farming sections there are jobs for men selling or serving as distributors of hybrid seeds, fertilizer, lime, seed-inoculation materials, fencing, quick-freezing units, and the like. A salesman would need to have a car. To take on a distributing agency would probably also require some capital and a central building for a warehouse.

### *Livestock Trader and Buyer*

This is a job for a man who knows livestock and stock values. To do much business he also needs a truck that will handle cattle or horses, plus a barn and pasture. Shrewd stock traders often do well financially, but one must not only have some facilities for handling stock but must be experienced in judging animals, values, and market outlets.

Some men establish egg and poultry buying routes and specialize in handling poultry products, though they are likely also to buy wool, honey, maple sirup, or other native products in season. There are jobs also in some sections for workers in cream- and poultry-buying stations.

### *Kennels*

Especially near the larger cities and towns, the kennel business offers possibilities with a comparatively modest outlay of capital. Such places may raise dogs or cats or may specialize in boarding pets for others.

### *Landscape Gardening*

In various suburban areas where there are numerous landscape-gardening concerns and nurseries, various jobs become available working for such concerns. Such work may be largely in the country or may be done largely in town, depending on the clientele. If one has some land he may gradually work into the nursery business for himself.

### *Farm Appraisers*

In some parts of the country a properly qualified man may find a full-time or part-time job working for private country banks, Farm Credit Administration, insurance agencies, and the like, appraising, servicing loans, writing insurance, etc.

### *General Farm Services*

In some progressive farming regions, young men have set up what is variously known as a

general farm service. One such office has been established by two young veterans in Montgomery County, Md. In order to make such a service succeed one must have had practical experience, a thorough knowledge of local agriculture, and preferably agricultural college training. The two men who operate the Maryland Advisory Service mentioned above, offer advice on breeding, feeding, all phases of crop growing and marketing, maintenance of equipment, drawing of farm leases, etc. If a suburban dweller with one cow wishes to find a bull of the same breed, they will arrange for such bull service. If a large dairyman wishes to buy a carload of purebred cows, they will find them for him. If a newcomer wants a complete plan and continuing oversight of his farm management they will supply it. Manifestly, this type of service requires a keen mind, a great deal of practical experience, and usually professional training in farm management to back it up. It has been known to pay fairly well, especially in the Midwest, and near some of the larger cities.



# Index I—Occupational Reports Classified by Broad Fields of Work

(Guide to Reports Through Entry Occupational Classifications; Part IV of Dictionary of Occupational Titles)

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## Occupations in the Armed Forces

Many occupations in the Armed Forces of the United States have civilian counterparts, and much service training prepares for civilian jobs. Information on the occupations in the Army, Navy, Air Force, Marine Corps, and Coast Guard may be obtained from their respective recruiting stations.

The occupational structure of the peacetime Navy has been analyzed for the major job fields in the United States Navy Occupational Handbook. This Handbook contains 66 vocational information briefs on Navy occupations which tell what the job is, the duties and responsibilities, where the work is done, qualifications and preparation, the training given, path of advancement, and related civilian jobs. Information is also given on promotions, pay, and other general facts to supply a complete understanding of the Navy's career fields. These books are available in all high schools, colleges, public libraries, State employment offices and Navy recruiting stations. They will serve as supplementary vocational information for related civilian fields.

Information on the many different types of occupations in the Army may be obtained in a series of Orientation Pamphlets on each of 50 career fields. The first of these, A Career in Army Food Service, DA 20-26, was issued in 1948 and the others will be published in 1949 as the balance of the career fields are introduced. Each pamphlet describes the specific jobs in each broad career field, the training opportunities and qualifications required for entrance into the field, opportunities for advancement (with a diagram of the job progression), and the self-study references and correspondence courses appropriate to each field which may be obtained through the United States Armed Forces Institute. The pamphlets will be available in Army recruiting stations, or may be obtained by writing to The Adjutant General, U. S. Army, Washington 25, D. C.

The Air Force is preparing a series of booklets on each of about 35 career fields in that branch of the Service. Each booklet will describe the work and responsibilities, the training given, the lines of promotion, and related civilian jobs. These booklets were to be made available after the middle of 1949 in Air Force recruiting stations or by writing to the Chief of Staff, Attention: PMP Headquarters, U. S. Air Force, Washington 25, D. C.

