The Mobility of ELECTRONIC TECHNICIANS 1940-52

The WORK EXPERIENCE, TRAINING, and PERSONAL CHARACTERISTICS of WORKERS in a NEW SKILLED OCCUPATION

Bulletin No. 1150

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Letter of Transmittal

United States Department of Labor,
Bureau of Labor Statistics,
Washington, D. C., March 12, 1954.

The Secretary of Labor:

I have the honor to transmit herewith a report on the mobility of electronic technicians. This report represents the results of the second of a series of pilot studies designed to explore the characteristics of workers in occupations critical to defense mobilization. Information about the personal characteristics, training, skills, and job duties of such workers, coupled with data on their past movements between jobs will help to prevent crippling manpower shortages in the event of full mobilization.

The Department of the Air Force financed this study as part of a general program of developing systematic methods of determining the manpower feasibility of military programs. The research findings of this report however, are the exclusive responsibility of the Bureau of Labor Statistics.

The study was conducted in the Bureau's Division of Manpower and Employment Statistics under the supervision of Raymond D. Larson. The report was prepared by James J. Treires.

The Bureau wishes to acknowledge the generous assistance and cooperation received in the course of the study from officials of other government agencies, trade associations, labor unions, and the more than 200 manufacturing, servicing, and broadcasting firms whose employees were interviewed. The Bureau wishes to express its deep appreciation to the more than 1,900 electronic technicians whose excellent cooperation provided the data on which this report is based.

Ewan Clague, Commissioner.

Hon. James P. Mitchell,
Secretary of Labor.

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INTRODUCTION

Defense mobilization in a heavily industrialized nation brings with it a host of dislocations and readjustments in the labor force. Expansion of military production, maintenance of essential civilian production, and curtailment of nonessential activities create labor problems that can be solved only through an understanding of the characteristics of the labor force.

Skilled manpower resources present a particularly serious problem because they can be developed only over a relatively long period of time and, once created, they cannot easily be changed from one form to another. A nation which has enough workers to fill all jobs may nevertheless suffer from a shortage of workers with particular skills.

The supply of skilled workers must be understood both in terms of the numbers of men working in each occupation and their tendency to move in and out of particular occupations. A knowledge of the mobility of workers is necessary to an accurate evaluation of the ability of the labor force to meet changing needs.

OBJECTIVES OF THE STUDY

To obtain information essential to evaluating the adequacy of the labor force in the event of full mobilization, the Bureau of Labor Statistics, with the support of the Department of the Air Force, has undertaken a series of studies of the mobility of workers in critical occupations. Specific questions to which these studies provide answers are:

1. What are the personal characteristics of the workers in an occupation and how will they affect the future supply and mobility of these workers?

2. How do these skilled workers get their training?

3. What are the sources from which fully or partially trained workers may be drawn?

4. How do these workers move between occupational specialties, establishments, industries, and areas, and what factors affect this movement?

Tool and die makers, 1/ electronic technicians, and coremakers and molders are occupations which have been selected from the Department of Labor's List of Critical Occupations for studies of mobility. Several related research projects being conducted outside the Bureau of Labor Statistics deal with the same general problems and explore the mobility of all workers in six major industrial centers. 2/ Another group of Bureau studies analyzes the Nation's resources of highly trained personnel in the natural sciences. 3/

Electronics is a field which has experienced tremendous growth over a relatively short time span. It thus affords an excellent opportunity to study the mobility of a skilled worker group.

Electronic technicians work in several industries which vary widely in their importance to defense mobilization. For instance, the production of home radio and television sets could be stopped entirely in wartime, but continuation of aircraft electronics productions would be vital to survival. One of the primary objectives of this particular study was therefore to determine from the actual movements of those working in this field the extent of interchangeability of workers among the several specialties included under the general job title, electronic technician.

The information presented in this study was obtained in a personal interview survey of 1,926 electronic technicians employed in eight of the Nation's largest metropolitan areas: Atlanta, Baltimore, Boston, Chicago, Detroit, Los Angeles, New York,

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1/ Mobility of Tool and Die Makers, 1940-1951; Bureau of Labor Statistics Bulletin No. 1120 (1952)

2/ The Mobility of Workers in Six Cities, 1940-1949: Survey of Occupational Mobility conducted by cooperating university research centers and the Social Science Research Council for the U. S. Department of the Air Force and the U. S. Bureau of the Census. Patterns of Mobility of Skilled Workers and Factors Affecting Their Occupational Choice, Six Cities, 1940-1951, Industrial Relations Section, Massachusetts Institute of Technology, Cambridge, Massachusetts, February 1, 1952.

3/ Occupational Mobility of Scientists, Bureau of Labor Statistics Bulletin No. 1121 (1953). Manpower Resources in Chemistry and Chemical Engineering, 1951; Bureau of Labor Statistics Bulletin No. 1132 (1953).

and Philadelphia. The survey, which was made in April and May of 1952, is described in detail in the Methodology section (p. 58).

THE ROLE OF ELECTRONIC TECHNICIANS

The operation of electronic equipment is based upon complex laws of physics. For this reason, the manufacture, installation, and maintenance of electronic devices require the services of skilled workers who understand these physical principles. Professional engineers design and develop equipment; electronic technicians install, test, maintain, and repair electronic equipment.

Electronic technicians perform specialized tasks involving the application of electronic theory in the manufacture, installation, maintenance, and repair of electronic equipment. The particular job duties of electronic technicians vary with the products and services of the establishments they work in. A radio repairman has different functions from an electronic technician in a laboratory; a broadcasting technician has few duties in common with an electronic technician in an aircraft plant. Nevertheless, there is a body of knowledge and skills common to all these groups.

Generally speaking, the electronic technician diagnoses the trouble in a piece of equipment by studying its "symptoms," makes tests to varify or correct his diagnosis, and then makes the necessary repairs. He uses meters and other testing components and circuits. He replaces defective parts, using electrician's hand tools such as pliers, screw drivers, wrenches, and soldering irons. After making repairs, he adjusts the equipment to proper operating condition.

This description applies most specifically to repairmen, but those technicians who construct, install, test, and maintain electronic devices must also perform some of the above operations. In manufacturing, the emphasis is on testing, inspecting, and repair. In research laboratories, construction of equipment from blueprints or wiring diagrams is one of the main jobs of the technician. In aircraft plants, electronic technicians are often concerned with fabrication and installation of electronic equipment. Technicians in broadcasting stations are primarily equipment operators, but they must have enough electronics skill to repair any of the station's electronic equipment.

Electronic technicians were chosen for study not only because they are essential workers in short supply but also because little reliable information about this relatively new job class existed. The tremendous importance of electronic equipment in modern warfare and its many uses in vital civilian communications

facilities made it necessary to obtain information about the supply of skilled workers required in its manufacture and maintenance.

Establishments employing most of the Nation's electronic technicians can be classified into the following groups: Those engaged in (1) home radio and/or television repair, (2) radio and/or television broadcasting, (3) manufacture of radio and/or television receivers, (4) manufacture of other electronic equipment, (5) manufacture of military aircraft, and (6) research and development. These groups are the six "types of establishments" which are discussed in the findings. The estimated number of electronic technicians in the civilian economy distributed by industry of employment is shown in table 7 on page 59.

THE FIELD OF ELECTRONICS

Some facts about the place of electronics and electronic technicians in our economy are essential to understanding the significance of the findings of this survey. Electronics is a field of science that is concerned with the applications of the vacuum or gaseous electron tube (or the recently developed transistor). Any device which uses such components is considered to be electronic equipment. Common examples are radio, television, radar, guided missile controls, and X-ray machines.

"Electromagnetic radiations" is a general term that includes radio, television, radar, light, heat, X-ray, and other wave phenomena. These radiations can be produced and used most efficiently through devices which employ electron tubes. Applications range from devices which detect a weak spot on a solid steel rail to computers which in a few seconds make mathematical calculations which would take days or even months to make mechanically.

For many years, radio was the only active field in what is now called electronics. The earliest radio transmitters and receivers did not have vacuum tubes and were therefore very inefficient. The introduction of electron tubes made it possible to send and receive waves on a narrow "channel," thus enabling many messages to be sent and received at the same time without interference. As a medium of mass-communication, radio has become so widely used that hardly a home in America is without a radio set.

A practicable television system was developed through the application of electronics. The picture tube in modern receivers is itself merely a large electron tube, with a tiny electron beam so controlled that it "writes" a complete picture on the

screen 30 times each second, a speed impossible to attain without electronics. Since World War II, the production of television receivers has burgeoned into a large industry.

The fact that electromagnetic radiations can penetrate fog, darkness, and even solids makes electronics of critical importance to our Armed Forces. Detection of enemy ships and aircraft, night flying and landing of aircraft, night bombing, gun-laying, and, of course, communications are all dependent on electronic devices. Radar is an absolute necessity to naval operations because of its ability to detect any ship or aircraft in range and even to identify it as friend or foe. For the same reasons, the Air Force is becoming increasingly dependent on electronic devices. Other military applications of electronics are guided missiles, fire control devices, and proximity fuses.

These developments in electronics were accompanied by changes in the job duties and skills required of the men and women working in the field. Before the 1920's the only noteworthy group that could be considered electronic technicians were the men who operated and maintained ship-to-shore wireless communications facilities. It was not until radio demonstrated its commercial feasibility that electronics became a significant source of employment for American workers. As home radio became increasingly popular, the repair of these sets developed into a profitable type of small business. Many of those who entered this business were hobbyists and amateur radio operators who repaired radio receivers first as a part-time source of income and later as a full-time job. The training these men received was obtained by reading technical books and magazines and experimenting with equipment in their own homes.

The public demand for radio receivers in the late twenties and thirties converted radio manufacturing from a small job-order operation into one of our principal mass production industries. Electronic technicians worked in these factories testing different parts of the sets on the assembly lines and trouble-shooting finished units. During this period, many vocational and technical schools began offering courses in radio, and their graduates entered repair, manufacturing, and broadcasting jobs.

The first commercial radio broadcast was made in 1920, but it was not until the early thirties that national networks with daily broadcasts became commonplace. The technicians who worked in the broadcasting stations did the same general type of work they do now, such as operating transmitting equipment, maintaining and adjusting sound pickup equipment, operating master controls, and maintaining recording equipment.

World War II had a tremendous impact on the electronics field. Although radio accounted for almost all of the activity in electronics in the prewar period, the needs of modern warfare

forced the development of electronic applications such as radar, loran, shoran, ground control approach systems, proximity fuses, and fire control systems. In addition to serving immediate practical purposes by developing new equipment, the wartime electronics industry conducted intense inquiry into basic research problems and paved the way for many of the new industrial and military applications of electronics that have marked the post-World War II period.

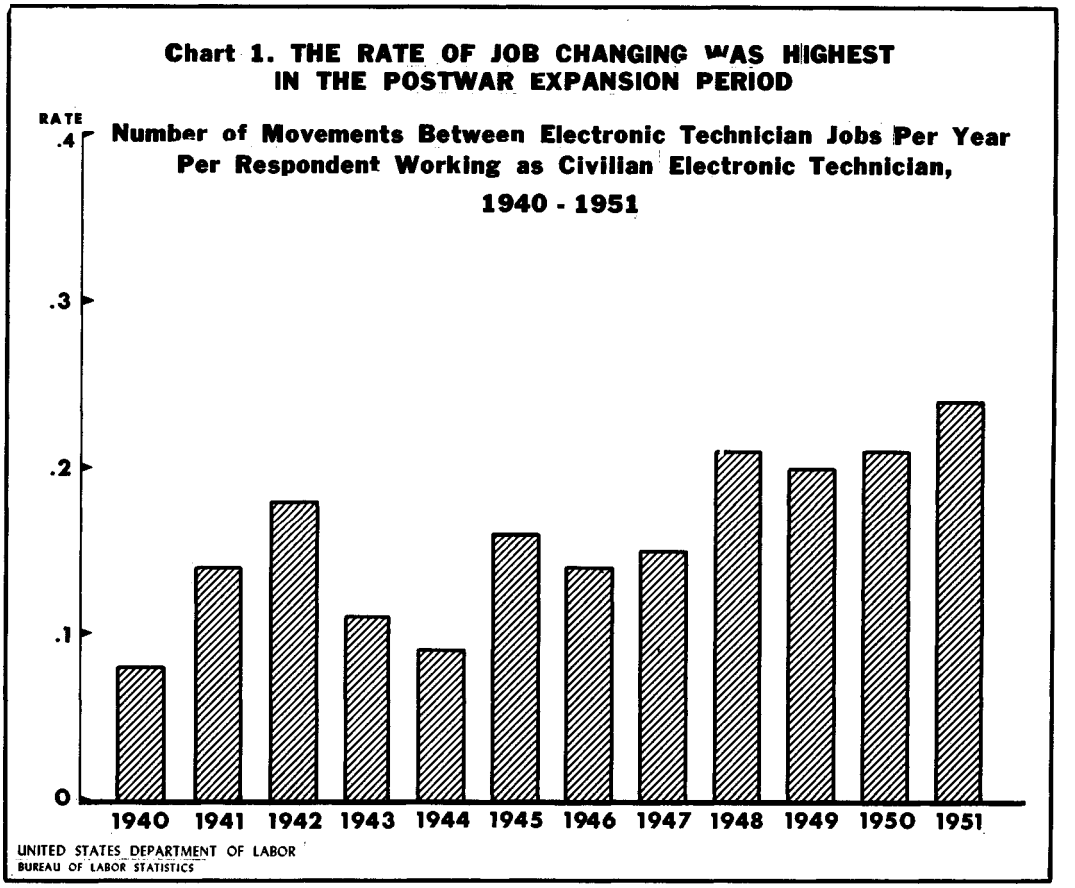
Perhaps more significant to the economy than the technical aspects of the wartime electronics program was its impact on the supply of electronic technicians. Although civilian radio broadcasting facilities were maintained throughout the war, manufacture of radio receivers was sharply curtailed, and many of these plants and their technicians shifted to the manufacture of electronic equipment for the Armed Forces. Some radio repairmen and radio broadcasting technicians also took jobs in these plants. Many younger men from all these groups moved into Armed Forces jobs operating, maintaining, and repairing vital electronic equipment used by our Armed Forces throughout the world.

However, the limited number of men in the civilian economy who had had good training in electronics in relation to the huge needs of the Armed Forces, and the technical differences between military electronic equipment and home radio sets made it necessary for the military services to meet the bulk of their needs by training new men. Thousands of young men drawn into the armed services who showed certain aptitudes in the standard induction tests were sent to school to learn to operate and service military equipment. As the following sections of this report will show, this group of technicians made up a large segment of the postwar electronics work force. The training they received and the skills they acquired while serving in the Armed Forces enabled many of them to take technicians' jobs in the fast growing postwar radio and television broadcasting, manufacturing, and repair industries.

SUMMARY OF FINDINGS

Electronic technicians were a young group of skilled workers who changed jobs relatively often from January 1940 to April-May 1952. They demonstrated an ability to move between jobs in such varied activities as broadcasting, radio and television repair, electronics manufacturing, and research. The most mobile workers were young men with only a year or two of experience in the field. Most electronic technicians showed marked aptitudes for the physical sciences. Electronics training in technical schools was the most common type of training for this occupation, though many technicians, particularly the older men had acquired much of their skill at home through reading and hobby work.

Chart 1. THE RATE OF JOB CHANGING WAS HIGHEST IN THE POSTWAR EXPANSION PERIOD



The annual rate of job changing among electronic technicians varied from 1 change for every 12 technicians employed in 1940 to about 1 change for every 4 in 1951 (chart 1). The average electronic technician changed jobs once every 4 years during the 12-year work history period covered in the survey. About 55 percent of the respondents had held civilian jobs other than electronic technician jobs during this period. Sixty-one percent had served in the Armed Forces, half of them serving as electronic technicians.

Less than half of the electronic technicians had held the job they were in at the time of the survey for more than 36 months. Electronic technicians in broadcasting had the longest average tenure in their jobs; over one-fourth of them had been in the same job for more than 8 years. Tenure was shortest in aircraft manufacturing, research, and other electronics manufacturing.

The most common method of obtaining electronic technician jobs from 1940 to the time of the survey was through unsolicited applications at plant employment offices. Another common way of getting jobs was through relatives or acquaintances working in the plant. Help-wanted ads accounted for a much smaller proportion of hirings. Among radio repairmen, opening a business of their own was a very common method of getting the "job".

Electronic technicians moved freely among the different types of electronics establishments. Electronic technicians in research had held the highest proportion of electronic technicians jobs in other fields, with the aircraft manufacturing group a close second. Radio and television repairmen showed the least diversity in electronics employment.

Previous experience in radio and television repair establishments was common among men working in other fields. Jobs in other electronics manufacturing and radio and television manufacturing also appeared frequently in the work histories of men working in other fields. On the other hand, experience in broadcasting stations, aircraft plants, and research laboratories was relatively rare among men in other fields.

Radio and television repair work was often a first job in which respondents acquired experience and skill and then moved into the other electronics specializations. On the other hand, broadcasting stations seemed to attract and hold some of the more experienced men who had worked in jobs in other types of establishments.

Electronic technicians performed a wide variety of job duties in the period studied. Previous experience in diverse electronic job duties was widest among technicians who in 1952 were employed in other electronics manufacturing, aircraft manufacturing, and research.

About 20 percent of the electronic technicians moved from one city to another in changing jobs over the 12-year period. Twelve percent made one area shift, 5 percent made 2 shifts, and 3 percent made 3 to 5 shifts.

The changing needs of employers for electronic technicians was the single strongest factor generating job shifts. The most common reason respondents gave for shifts among electronic technician jobs from 1940 to 1952 was to take a better job. Twelve percent of the jobs were left because of layoffs.

Age was the main personal characteristic affecting mobility. The only other significant differences between the men who changed jobs from 1940 to 1952 and those who did not were in years of experience as an electronic technician and in home ownership. Those who changed jobs were younger, they included a lower proportion of home owners, and they had fewer years of experience in electronics.

Though the job changers included a lower proportion of married men and fathers, and a slightly higher proportion of high school graduates, these differences can be attributed to age and other factors. No direct influence of marriage, fatherhood, or education on job changing is apparent in the findings.

TRAINING

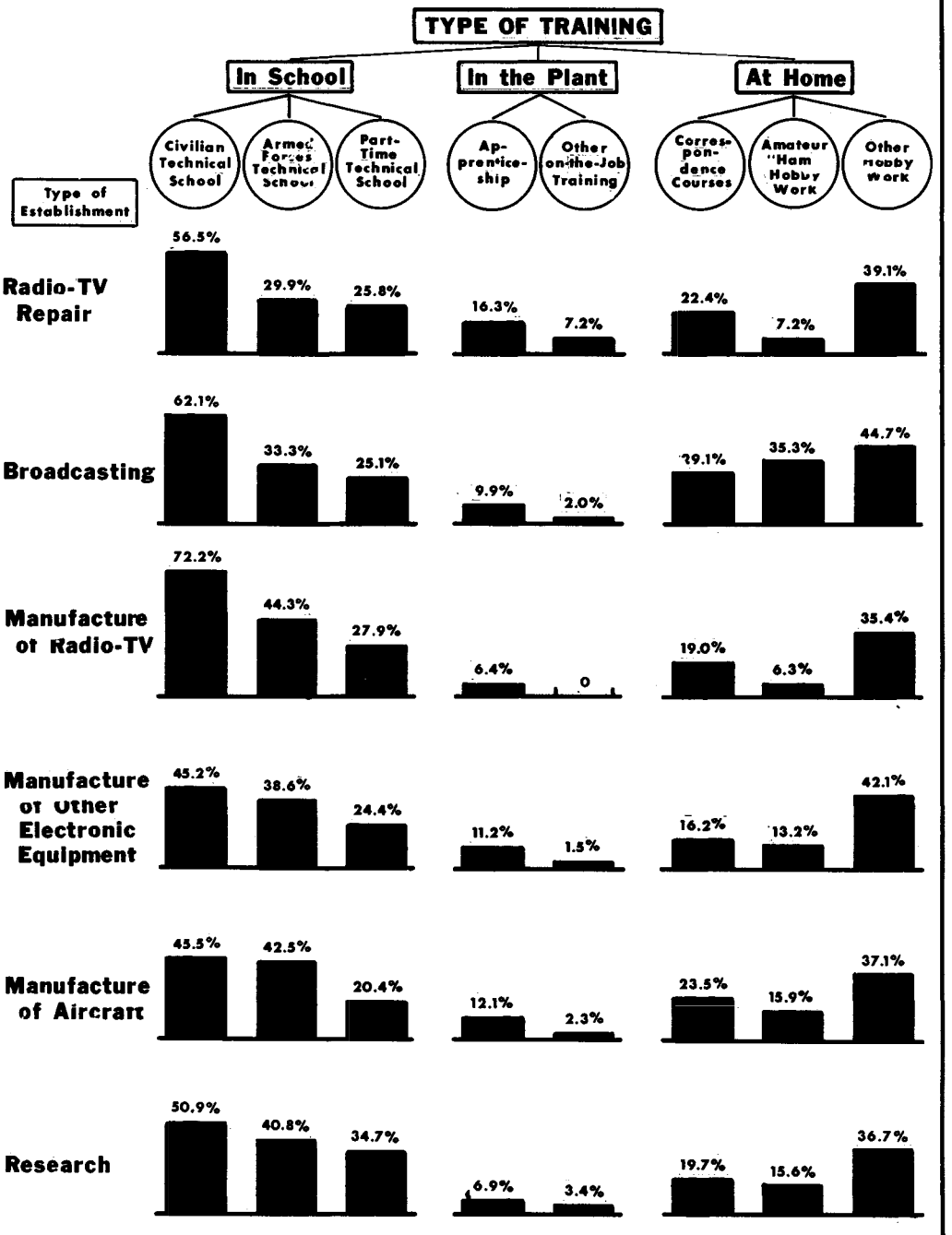
Technical school courses were the most important type of training among electronic technicians (chart 2). More than half of the technicians had attended full-time civilian technical schools, and one-third received training in Armed Forces schools. About 5 percent of the technicians had been apprentices and 13 percent reported other on-the-job training.

Learning in the home, an unusual method of qualifying for most skilled jobs, was a very common method of acquiring skill in electronics. Many technicians attributed some of their skill to correspondence courses, home study, amateur "ham" radio work, and other hobby work.

Most of the men who attended full-time civilian technical school took courses lasting 12, 18, or 24 months. Those who attended Armed Forces technical schools usually took 6- or 12-month courses.

Chart 2. ELECTRONIC TECHNICIANS IN THE 6 TYPES OF ESTABLISHMENTS HAD SIMILAR TRAINING BACKGROUNDS

Percent of Respondents in Each Type of Establishment Who Previously Had Specified Types of Training



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If a technician had undergone more than one type of training, he was counted more than once.

PERSONAL CHARACTERISTICS

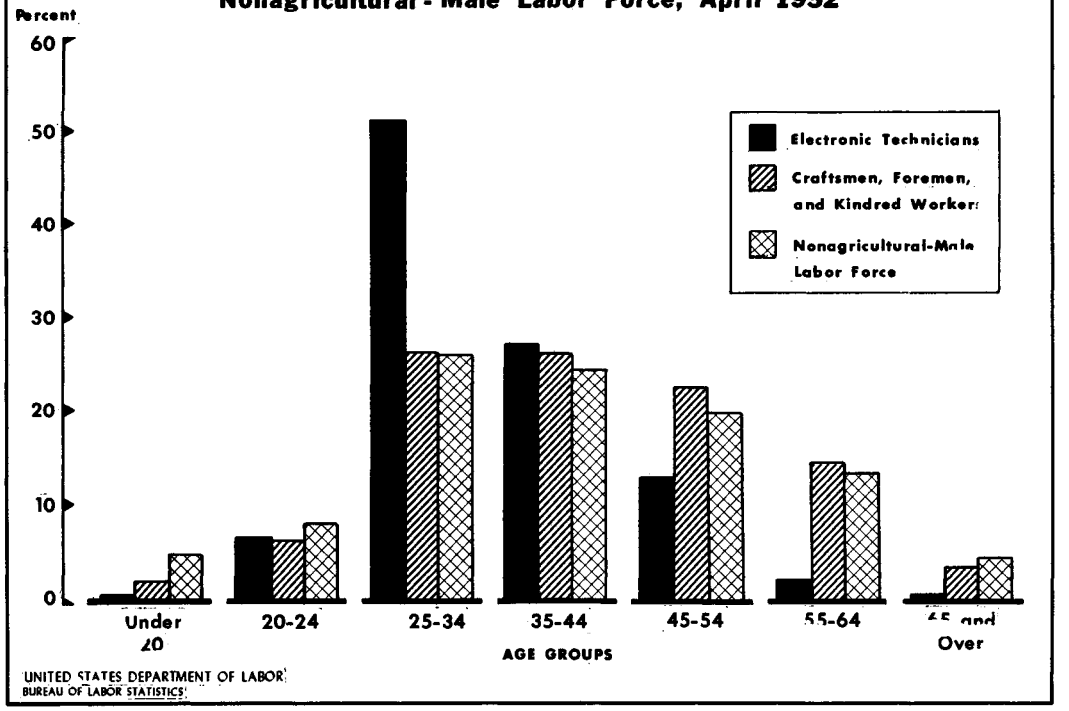
A majority of the men who took jobs as electronic technicians were high school graduates who had a definite aptitude for mathematics and the physical sciences. More than half of the electronic technicians came into this field directly from school or the Armed Forces. Electronics was their first regular occupation. Less than one-third of the men in the survey had worked as electronic technicians before 1940.

Over half of the electronic technicians manifested in their youth an interest in electronics, which led eventually to their taking jobs in this field. Other men were influenced to enter electronics by Armed Forces training, family or friends, attractiveness of electronics as a field with a good future, school training, and experience in a related field, usually electricity.

Electronic technicians employed in 1952 were a relatively young group of skilled workers; their median age was 33 (chart 3). Four out of 5 were married, and three-fourths of the married men were fathers.

Chart 3. ELECTRONIC TECHNICIANS ARE A YOUNG GROUP OF SKILLED WORKERS

Age Distribution of Respondents Compared With Craftsmen, Foremen, and Kindred Workers, and Entire Nonagricultural - Male Labor Force, April 1952



Technicians in broadcasting received the highest median earnings, 4/ followed in declining order of earnings by those in aircraft manufacturing, other electronics manufacturing, research, radio and television repair, and radio and television manufacturing. The range of earnings was widest in radio and television repair, and narrowest in radio and television manufacturing.

A great majority of the electronic technicians in broadcasting and radio and television manufacturing worked a 40-hour week. Workweeks of over 40 hours were quite common in the other four groups, especially in radio and television repair.

Electronic technicians were versatile in terms of ability to make major repairs on different types of equipment; over half could repair four or more types of equipment.

4/ Only broadcasting stations in large cities were covered by the survey. See p. 20.

MANPOWER IMPLICATIONS

The most important implications of the findings are those which relate to effective manpower planning. What does this study tell manpower administrators about the adequacy of our supply of electronic technicians? What does it indicate would be the most efficient ways of increasing the supply in the event of full mobilization?

THE FUTURE SUPPLY OF ELECTRONIC TECHNICIANS

The supply of electronic technicians will not be decreased to any significant extent by deaths, retirements, or movements out of the field during a foreseeable mobilization period. The youthfulness of electronic technicians indicates that losses due to death and retirement will be relatively slight. Over the next decade, these losses should amount to about 9 percent of the present members of this occupation, compared with 18 percent for the entire male labor force. 5/

The fact that electronics was not only a source of a job but also an early-acquired avocational interest of electronic technicians suggests that they are less likely to move out of their field than workers whose jobs have little relation to their leisure interests. Although many respondents left electronics at some time during the 1940 to 1952 period and others not covered in the survey probably left permanently, increasing employment in electronics during this period indicates that these losses were more than offset by the many new men entering the field each year. It is, therefore, likely that the attractiveness of this field for new entrants in the labor market and the strong job attachments of those already working as technicians will insure a gradually increasing supply of electronic technicians in the years ahead.

5/ Based on Tables of Working Life, U. S. Department of Labor, Bureau of Labor Statistics Bulletin 1001, 1950.

MEANS OF MEETING FULL MOBILIZATION REQUIREMENTS

In the event of full mobilization, serious shortages of electronic technicians in vital civilian industries and the Armed Forces will develop unless measures are taken to prevent them. How could the additional electronic technicians needed in these activities be obtained most efficiently? The survey information shows how mobilization needs might be met by using each of the following methods:

1. Transferring skilled workers into essential activities from nondefense work;

2. Upgrading and giving additional training to partially skilled men;

3. Upgrading women working in lower level electronics production jobs;

4. Training new entrants selected on the basis of their aptitudes.

Transfers of Skilled Workers Into Essential Activities

Electronic technicians in 1952 worked in establishments whose importance to mobilization needs was extremely varied. Although the pool of skilled electronic technicians employed in all these establishments would be inadequate to meet full mobilization requirements, it provides a much larger base for meeting such requirements than that available during the pre-World War II period. Thus, one of the principal methods of meeting mobilization needs for electronic technicians in any future emergency might be through transfers of skilled men from less essential to more essential activities. The survey findings indicate that such job shifts would be feasible.

Electronic technicians working in different types of establishments had very similar training, equipment skills, and personal characteristics, and their work histories showed considerable mobility between different types of electronics establishments. For example, some of the technicians engaged in repair of home radio and television receivers could transfer to plants manufacturing military electronic equipment or aircraft, and others could take jobs in research laboratories. The survey data indicate that movements out of home receiver repair into the other specialties have been the most common type of interindustry shift. Furthermore, when manufacturing plants shift from civilian to military production, as many did in World War II, their technicians shift into essential activities without changing their jobs.

If it were necessary for interindustry shifts to be encouraged or induced, should appeals be directed to any specific type of person who would be more likely to respond to them? What inducements would be most effective in producing these shifts?

The survey indicates that young men with little experience in electronics are most likely to change jobs. Such workers, however, are usually less versatile and less skilled, and are therefore of limited value to employers who need skilled manpower immediately.

Although the survey shows some variations in mobility rates among electronic technicians of different ages and experience, it also shows that, as a group, electronic technicians are above average in their propensity to change jobs. In the event of full mobilization, a program for inducing these workers to transfer into essential industries should therefore be directed at the entire group without regard to their personal characteristics.

The strength of the attachments of electronic technicians to particular firms, types of plants, or labor market areas bears on the extent to which the existing supply of electronic technicians can be considered as a pool of manpower available to the entire Nation. The survey shows that electronic technicians were not strongly bound to particular employers. Although they seemed to be somewhat attached to a particular type of electronic establishment, their strongest attachment was to the general field of electronics. Once a man became a skilled electronic technician, he was disposed to remain in the electronics field, though he showed considerable willingness to change jobs within it.

As for changes between labor market areas, electronic technicians may be more likely than many other skilled workers to move from one area to another because they are a relatively young group of workers. However, like other workers they required a much greater stimulus to move between areas than to make job changes within an area. These findings indicate that manpower authorities in a full mobilization period could count on considerable voluntary movement of electronic technicians among employers and types of electronics establishments, and some mobility among labor market areas.

Most job changes among electronic technicians were motivated by a desire to "take a better job." The inducements most effective in stimulating voluntary movements into essential electronic technician jobs are thus bound up with all the factors which enter into a worker's judgment of a good or bad job, such as wages, hours, working conditions, distance from home, and steadiness of employment. An exhaustive investigation of the relative importance of these factors was beyond the scope of this study, but even the limited information obtained suggests certain policies. Obviously, some of the factors which workers generally consider in rating the

desirability of a job, such as wages, hours, and working conditions, can be made more attractive to induce electronic technicians in nonessential activities to move into essential jobs. However, certain other characteristics of a job, such as distance from a worker's home or lack of long-term security, cannot be as easily altered through a manpower program.

The value of the existing supply of electronic technicians as a base for meeting full mobilization requirements depends to some extent on the proportion who possess a good, all-round knowledge of electronics. Such men can shift from one type of activity to another with a minimum of additional training. They can act as working supervisors of less skilled men or instruct new men in on-the-job training programs. It is therefore suggested that another way to help prevent shortages is to encourage men already working as technicians to obtain additional training in phases of electronic theory and practice that are not necessarily connected with their present jobs.

The present supply of electronic technicians available to the Armed Forces provides a much larger base for expansion than their pre-World War II supply. Nevertheless, many additional men would be needed for full mobilization. In view of the findings, how would military needs for electronic technicians be met without seriously depleting the supply available to defense industries?

Since electronic technicians are a young group of skilled workers, a number of them would probably be inducted. Every effort should be made to place every qualified electronic technician in an Armed Forces job requiring his skill. The more highly skilled technicians could serve as instructors in service schools or as supervisors of the partially skilled. In addition to men in uniform, civilian electronic technicians working in less essential activities could act as instructors and supervisors at military schools and installations.

Most electronic technician assignments in the Armed Forces require a basic knowledge of electronics plus a detailed knowledge of the construction and functioning of a particular type of equipment. Though men with work experience already possess the basic electronics knowledge, they often require additional instruction before they can qualify for an Armed Forces job. For these reasons, the Armed Forces would probably depend upon their own training programs to meet the larger share of their full mobilization requirements, although the experienced civilian supply would be a more important source of electronic technicians than it was in World War II.

Drawing Partially Trained Workers From Other Fields

Are there workers outside the field of electronics who could become skilled electronic technicians with little additional training? The survey provides some indirect evidence that there are very few of these workers. It shows that more than half of the men in this field had engaged in no regular occupation before entering electronics. Of those who had held jobs, only one-fifth had been in jobs related to electronics, and only a few of these jobs, such as electricians, required knowledge and skill similar to that of electronic technicians.

Women Technicians

The survey showed very few women working as electronic technicians, but the possibility of their use in future emergencies merits consideration. If adequate mathematical and technical training were made available to women, many of them could qualify in this field. Many of the jobs in electronics manufacturing plants which do not require an understanding of electronics, such as routine testing and assembling jobs, are held by women. Upgrading them into electronic technician jobs would require extensive training, but the effort would be warranted if male electronic technicians were in extremely short supply.

Establishing Training Programs for New Workers

Shifting experienced skilled workers into vital defense industries would only partially meet requirements under full mobilization. It will be necessary to train many thousands of additional workers to satisfy the most pressing needs of the Armed Forces and the war productinn industries. Since it might be difficult to establish a large-scale, long-term training program after the mobilization period began and since the graduates might not be available in time to participate in the mobilization effort, such a program should be initiated in advance of mobilization.

The survey findings can aid considerably in guiding the establishment of training programs to develop all-round electronic technicians. They indicate that there are a number of specific aptitudes and interests that should be used as the basis for selection of trainees. Most of the men who succeeded in this field liked mathematics and physical sciences and had shown an interest in radio and electronics long before they entered the labor market. Theoretical knowledge and background is much more important in this field than in most other skilled occupations and the experience of civilian and Armed Forces schools indicates that some men can master the necessary theoretical concepts much more easily and rapidly than others. A careful selection system which

would attempt to induct into training those who were "most likely to succeed" would be a major factor in assuring the effectiveness of any training program. In this connection, the work which has been done in developing aptitude tests could be broadly applied to the problem of selecting trainees for electronics technician work.

The findings also provide information on the methods and content of an effective training program. Electronic technicians and their employers were asked for specific suggestions about the best ways of training electronic technicians. The most frequent response was that an ideal program would combine classroom instruction in electronics theory, repair and service procedures, and related topics with actual work in a particular job on a concurrent, daily basis. Both elements are necessary--without substantial theoretical training, a worker may not fully understand how electronic equipment operates; without actual work experience, the practical applications of theoretical instruction are not fully appreciated and much of the theory is forgotton during the training period.

Logically, a program for training electronic technicians should be started before mobilization actually begins. In practice, however, such a program would face many difficulties. For example, is it feasible to train a large number of technicians in advance of actual mobilization needs in the light of more limited peace time requirements for such workers? Past experience in war emergencies indicates that this is not a very efficient method of meeting the problem. A more effective measure would be the development of a program of giving broad technical training to as large a proportion as possible of the new entrants into the field. Although many men qualify as electronic technicians each year, they do not have the all-round, varied abilities of experienced men in the field. In addition, there are other people such as television antenna installers, doing work related to electronics who do not qualify as electronic technicians. Establishing a broad program of training for these groups would provide a large new pool of skilled workers who would be available for electronic technicians work in a mobilization period. Although this program would give many workers training beyond the minimum requirements for the jobs they actually hold, it would be more desirable than training large numbers of men to be technicians, beyond the needs of the peacetime economy. This is emphasized by the fact that formal training alone is not sufficient to qualify a man for electronic technician's work, especially when it is not combined with actual job experience.

One method of increasing the number of men with broad technical background is by stimulating an expansion in apprenticeship training. Since this approach would probably not expand the supply of skilled workers to necessary levels, additional training programs would be required to bring in such workers above the

normal inflow of trainees. Such programs should be carefully planned to make sure that the students receive training which will directly qualify them for jobs and that the skills they acquire will be maintained for early use in a possible full mobilization period. This might be accomplished by capitalizing on the hobby interest of many persons in the electronics field. They could be given part-time, intensive courses in electronics combined with practical work-type experience. Periodic refresher courses and tests of work proficiency would help keep them prepared for quick transfer into electronic technician jobs in an emergency and would keep them abreast of current developments in electronic equipment. A special reserve of qualified technicians would thus be available in an emergency.

FINDINGS

THE NATURE OF THE STUDY

The findings of this study must be interpreted in the light of the nature of the survey and the time period which it covered. A limitation on the significance of the findings arises out of the fact that an unknown number of men have entered and left electronic technicians' jobs in past years and are thus not represented in our sample. However, this limitation is not very serious in the case of electronic technicians because of the peculiar experience of the electronics industry in the period covered by the survey.

From 1940 to 1952, skilled electronic technicians were in short supply. Wages offered were relatively high, and a generally favorable labor market made it easy for workers to change jobs. These and other factors, particularly the continuous expansion in the field of electronics make it very unlikely that many men who were below retirement age and had the skills of an electronic technician were not working as technicians at the time of the survey. As for those who had retired, both the fact that hardly any electronics jobs existed before 1920 and that so few older men were found in the survey (see chart 3 on page 11) indicate that they were a very small group.

Since this survey was confined to eight large metropolitan areas, its findings are directly applicable only to electronic technicians in such areas. Most men employed in manufacturing and research live in large metropolitan areas, so that the findings about these groups may be considered typical. However, electronic technicians in broadcasting stations and in radio and television repair shops in smaller cities and towns are much less adequately described by the findings.

This report describes 1,926 men who were working as electronic technicians in April-May 1952. It is based on information they gave about their past history and present status. Three time periods derived from the survey data are covered in the analysis:

1. The time at which the respondents were interviewed (April-May 1952).

2. The time when they took their first full-time job as electronic technicians (varies from 1914 to 1952).

3. The work history period reported by the respondents (January 1940 to April-May 1952).

The first time period covers the facts about electronic technicians as of April-May 1952. The second period--at time of first entry into the occupation--is essential for studying the factors surrounding the transition from other statuses into electronic technician jobs. The third period, on which the analysis of mobility is based, covers all the facts reported by the 1,926 men about their labor-force status changes since January 1940.

All three of the above time periods figure in the analysis, but only those findings dealing with the first are entirely free from misinterpretation because they deal with the respondents after they had all become electronic technicians. The second period, on the other hand, covers the respondents at a time when they had not yet become electronic technicians, and the third covers both situations. Thus, in the sections about entry into electronics and movements since 1940, the characteristics of a group of individuals destined to become electronic technicians are described.

The work history information obtained in the survey pertains to a period of high employment levels. It is therefore a good indicator of full mobilization propensities but a much less reliable indicator of behavior in an unfavorable economic climate.

Comparisons made in the following sections are intended for consideration in the following frame of reference: How were electronic technicians different from other members of the labor force? Adjectives such as "high", "low", "young", and "mobile" are used here to mean that electronic technicians possessed the characteristic under discussion to a greater or lesser extent than other workers.

In many instances, no control group data were available. Nevertheless, inferences were drawn on the basis of deviations from expected results, assuming that certain facts about electronic technicians--for example, that 36 percent reported mathematics as their favorite high school subject--were not true of the male labor force generally. The validity of these inferences depends upon the accuracy of our analysis of indirect sources of information about the male labor force.

Analytical Concepts

The main object of this study was to learn how men find their way into electronic technician jobs, and how they then move among different types of electronics establishments, employers, and labor market areas. The work-history analysis used in this study is more comprehensive than those used in previous studies of occupational mobility. Instead of selecting from a complete work-history period specific types of activity or specific points in time, this study considers the work-history period in its totality, showing what each respondent was doing in each month of the 12 years in terms of type of labor-force status. 6/ This method permits a detailed tracing of the steps through which new men enter a skilled worker category, and, at the same time, allows the usual analysis of the movements of workers after they are qualified. A brief description of the analytical procedures follows.

Each continuous time segment spent in one pursuit by each respondent (after leaving high school) from January 1940 to April-May 1952 was considered a "labor-force status." These labor-force statuses were then classified into the following groups:

Types of labor-force statuses

0 Electronic technician job
1 Other civilian job
2 Armed Forces job as an electronic technician 7/
3 Other Armed Forces job 7/
4 Unemployment
5 Student in electronics at technican or vocational school or college
6 Student in college or other post-high school

The term "labor-force status" is used to describe these categories because it comes closest conceptually to the kind of situation under consideration--that of a man to whom seeking a job or not seeking a job is a matter of choice or chance. For example, a boy in high school is not usually considered free to take a full-time job, so he has no status in relation to the labor force. On the other hand, men in the Armed Forces or in a post-high school educational institutinn would, but for their choice or the needs of

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6/ See definition in following paragraph.
7/ Technically, these statuses are outside the labor force.

the Nation, be in the labor force. These categories (groups 2, 3, and 6 above) are essentially negative labor-force statuses. They are used in this analysis because they appear in the work histories of a great many respondents, who interrupted their work careers to attend technical schools or to serve in the Armed Forces.

For each of these statuses, the data answer the questions,--When?, Where?, and For how long? For each job held by a respondent, whether in or out of the Armed Forces, (groups 0, 1, 2, and 3) the data show what kind of work he performed. For every civilian job (groups 0 and 1) held by a respondent, information is provided on how he happened to get the job and why he left it.

Analysis of worker movement involves breaking up the "flow" of changes into static situations, delineating the characteristics of those situations, and then attempting to reconstruct the reality by studying the order in which the different situations follow each other. Thus the analysis of "changes" in labor-force statuses actually consists of a presentation of static situations (labor-force statuses) in terms of number, type, timing, and sequence.

For the purposes of this report, a labor force status change is defined as a movement from one job or pursuit to another. It may or may not involve a change in type of status. Thus, a movement from one electronic technician job to another is one change, and a movement from an Armed Forces job to technical school is also one change.

The findings presented in this section deal with (1) all changes in labor force status made by the 1,926 respondents from January 1940 to April-May 1952, and (2) movements of these men among electronic technician jobs during this period.

Labor-force Status Changes

The labor-force status changes of the 1,926 respondents during this 12-year period can be studied from several different viewpoints:

a. Volume, type, and time of changes--How many and what kinds of changes were made, and when?

b. Direction of changes--What were the net effects of these changes in terms of the number of men in each type of status each year as they moved toward the eleetronic jobs they held at the end of this period?

c. Distribution of changes among individuals--How many individuals spent time in how many statuses, in total and by type over the 12 years?

Volume, Type, and Time of Changes. All labor-force status changes made by the respondents from 1940 to 1952 are shown in chart 4. The upper half of the chart shows how many changes of all types occurred in each of the 12 years, and indicates how many of these changes consisted of direct shifts from one electronic technician job to another. The lower half of the chart shows the total changes made in terms of the type of status left and the type of status entered. 8/ For example, it shows that 303 of the changes were made by men who moved into civilian electronic technician jobs from an electronic technician assignment in the Armed Forces.

The 1,926 men in the survey made a great many labor-force status changes from January 1940 to April-May 1952, reporting 9,187 different statuses over this period, or 7,261 status changes (9,187 minus 1,926). The most common type of shift was from one electronic technician job to another. There were also a great many movements into and out of the Armed Forces and civilian electronics schools. Each year, a considerable number of electronic technicians left this field to take other work or attend school. Discharges from the Armed Forces and postwar reconversion to a peacetime economy made 1946 the year of greatest movement, when 1,080 labor-force status changes were made. The volume of changes continued high through the postwar period as more and more men moved between statuses in electronic technician jobs, other civilian jobs, and civilian electronics schools.

Nearly a thousand of the respondents left high school during the 12 years to enter one of the status categories mentioned above, with most of them moving out during the earlier years of the work history period. These movements are not counted as labor-force status changes, however, since they do not involve leaving a previous labor force status.

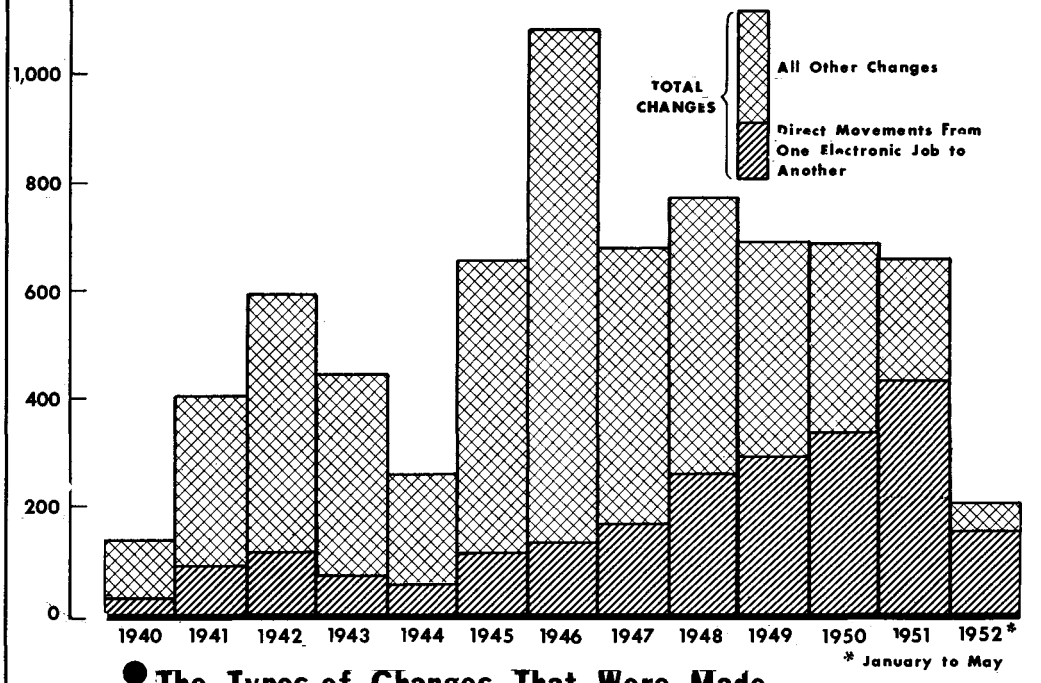
Direction of Changes. The net effects of the status changes made each year on the number of respondents in each status determine the general direction of movement over the 12 years. For instance, the net effect of all the movements was that all 1,926 men had moved into electronic technician jobs by April-May 1952. Chart 5 illustrates the changing importance of the several types of statuses over the 12 years.

The general pattern of movement of men into electronics was from high school to technical school or an interim job into electronic technician jobs. A great many of the respondents moved into the Armed Forces during World War II; almost half of them (48 percent) were in this status at the end of 1944. Over half of those in the Armed Forces served as electronic technicians. Unemployment was infrequent and of short duration, and occurred mostly in the postwar reconverion period.

8/ See appendix C for table showing all movements by type and year.

Chart 4. THE 7,261 LABOR-FORCE STATUS CHANGES MADE BY THE RESPONDENTS:

● When the Changes Were Made....



● The Types of Changes That Were Made

From	TOTAL	E. T. Job	Other Civ. Job	Technical School	Armed F.- E. T. Job	Armed F.- Other Job	Unem - ployment	College
	To							
TOTAL	7,261	4,049	1,200	668	472	393	398	81
Electronic Tech. Job	2,790	2,253	122	79	192	72	66	6
Other Civilian Job	1,985	597	561	220	232	294	67	14
Technical School	765	576	60	41	33	12	39	4
Armed Forces Electronic Tech. Job	635	303	115	103	-	-	92	22
Armed Forces Other Job	563	114	205	106	-	-	123	15
Unemployment	410	165	109	106	7	9	-	14
College	113	41	28	13	8	6	11	6

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A few case histories will illustrate more graphically the way in which respondents moved among labor-force statuses over the 12 years. The following three were chosen as examples of workers who, in terms of labor-force status, were (A) nonmobile, (B) of average mobility, and (C) exceptionally mobile.

Mr. A was working in a broadcasting station in Boston at the time of the survey. He was 35 years old, a high school graduate, married, and had 4 dependents. He had held only this one job, which he took in 1939, over the entire work history period.

Mr. B, a television repairman in a radio-television repair shop in Chicago, had held 5 different statuses over the 12 years. He was 34 years old in 1952, married, but had no children. He had had some college work in electrical engineering. In 1939, he took a job in a drug store. After 2 years, he moved to a job as a government clerk, where he remained until he entered the Armed Forces in 1942. After 4 years in the service, he entered a technical school where he studied electronics under the GI bill. In 1947, after a year of schooling, he obtained a job as an apprentice technician in the repair shop where he worked at the time of the survey. The apprenticeship lasted 2 years, after which Mr. B became a qualified technician.

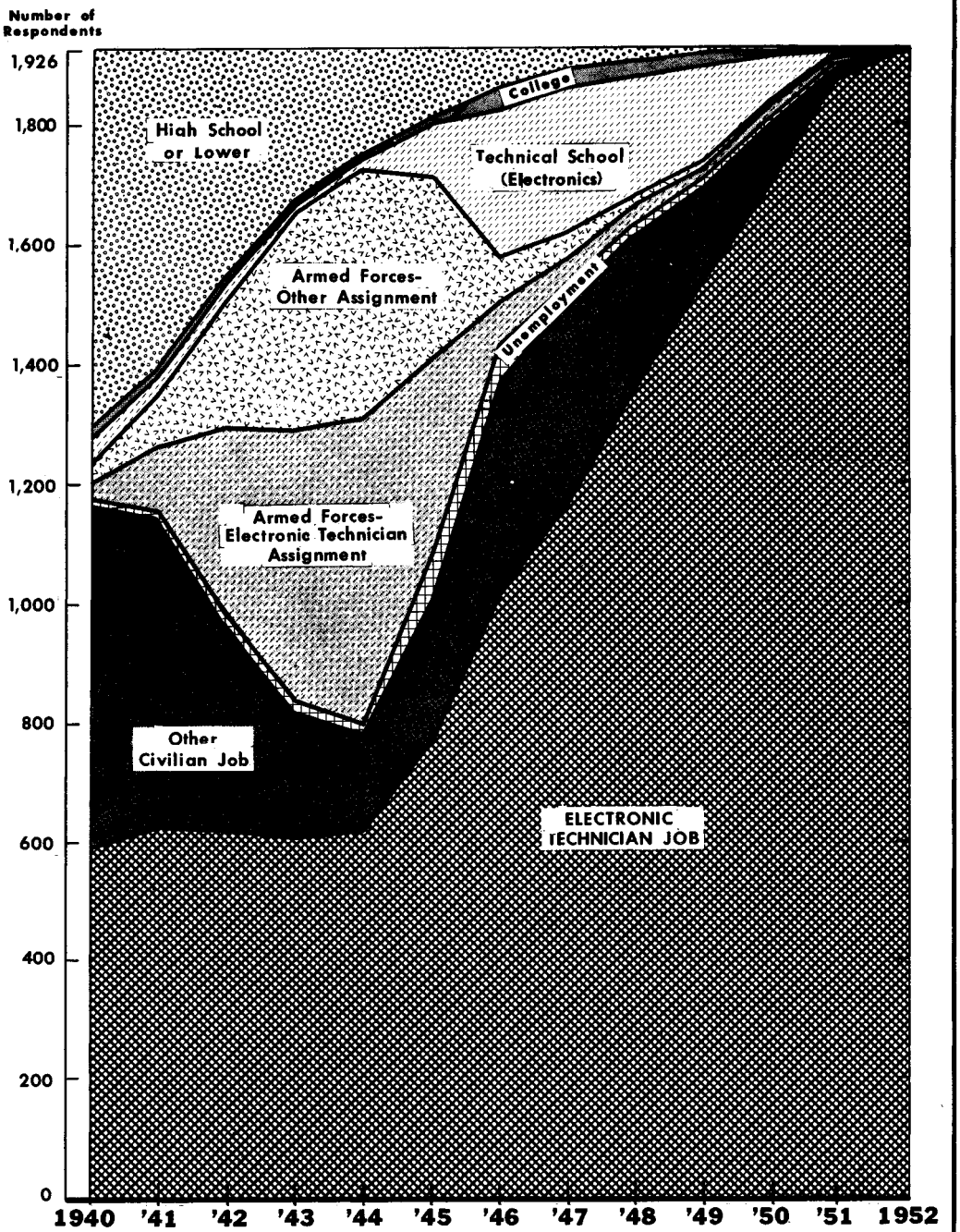
Mr. C was working as a research assistant in a Los Angeles aircraft plant at the time of the survey. He was 26, single, and had no dependents. After leaving high school in 1943, he spent a year in college studying electronics. In 1944, he entered the Navy, serving as an electronic technician until his discharge in 1946. After a 3-month period of unemployment, Mr. C returned to college for a year. He left to take a job as a TV technician with a large home-receiver repair firm in 1947. The following year, he quit the job to return to college. He left college again at the end of the school year, taking a job as a machinist in June 1949. After 5 months, he left this job to return to the repair firm as a TV technician, where he remained until October 1951, when he took the job at the aircraft plant.

Distribution of Changes Among Individuals. The analysis of the gross volume of labor-force status changes does not indicate to what extent the group experience is typical of individuals. How many changes did each man make over the 12 years? What kinds of changes were they?

The great volume of status changes were caused by the majority of the men making several moves. Two-fifths of the respondents held 3 or more jobs as an electronic technician over the 12 years. More than one-fourth of them held two such jobs, and the remaining third held only one job.

Chart 5. CHANGING LABOR FORCE STATUS OF RESPONDENTS, January 1940 - April-May 1952

Distribution of 1,926 Respondents By Labor Force Status As of End of Year



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In addition, over half of the respondents had held civilian jobs other than electronic technician jobs. One-fourth of them held one such job, one-sixth held two such jobs, and about one-eighth of them held 3 or more.

Thirty-two percent of the respondents had been in an Armed Forces electronic technician job, and 29 percent had been in the Armed Forces in some other assignment. Thirty-five percent attended civilian technical school at some time during the 12 years, and 5 percent attended such schools on two or more occasions. Unemployment was experienced once by 16 percent of the respondents, and two or more times by 3 percent.

Movements Into and Out of Electronic Technician Jobs

Although the complete work history of the respondents is necessary to an understanding of their labor force experience, a detailed analysis of their movements into and out of electronic technician jobs is more directly related to the central problem of the study--how often and for what reasons electronic technicians change jobs.

In this section, movements into electronic technician jobs include not only direct movements from one electronic technician job which involve movements out of other types of labor-force statuses. Similarly, movements out of electronic technician jobs include movements into other types of statuses.

These job changes are analyzed from four general viewpoints:

a. How often did electronic technicians change jobs?

b. How were electronic technician jobs obtained?

c. How many movements between electronic technician jobs involved changes in: type of establishment, job duties; employer; and labor market area?

d. What factors influenced respondents to make these job changes? Were men who made changes different from those who made no changes?

The answers to these questions were obtained by analyzing the 4,712 electronic technician jobs held by the respondents from January 1940 to April-May 1952.

The Rate of Job Changing Among Electronic Technicians. Electronic technicians changed jobs frequently from 1940 to 1952. The survey showed that the average respondent had changed jobs about once every 4 years. However, these movements were not evenly distributed over the work history period.

Chart 1 shows that the rate of job changing varied considerably from year to year. In 1940, the year of least relative movement, about 1 technician in 12 changed jobs, while in 1951, the year of greatest movement, 1 technician in 4 changed jobs. The upward trend in the rate of job changing reflects the rapid development of the electronics industry.

Methods of Obtaining Electronic Technician Jobs. For each of the 4,712 electronic technician jobs held by the 1,926 respondents over the 12 years, the question "How did you happen to get this job?" was asked. The answers, summarized in chart 6, show the relative importance of various methods of obtaining electronic technician jobs.

Chart 6. HOW RESPONDENTS OBTAINED ELECTRONIC TECHNICIAN JOBS . . .

Percent of Electronic Technician Jobs Held By Respondents From 1940 to 1952 That Were Obtained Thru Specified Methods

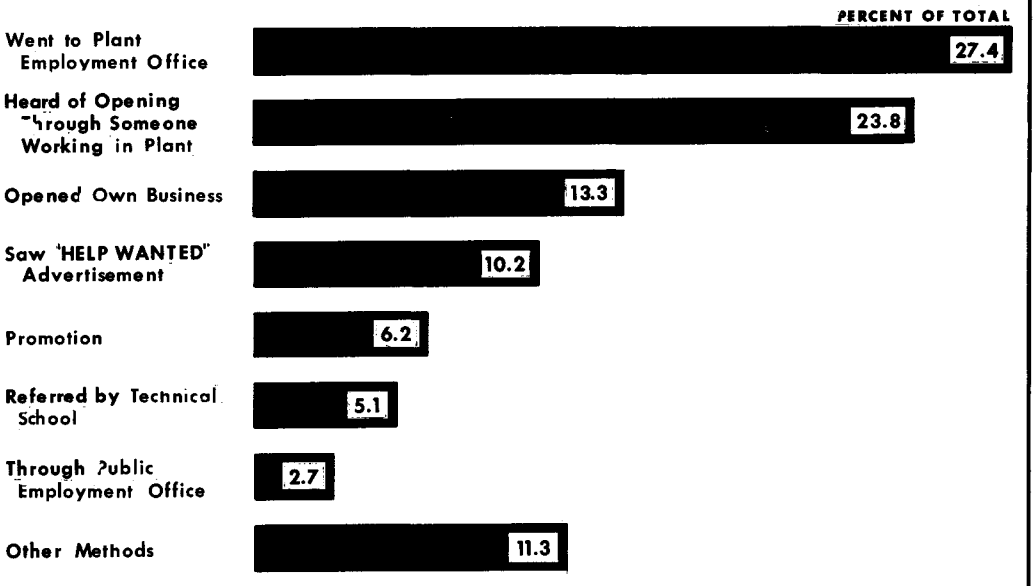
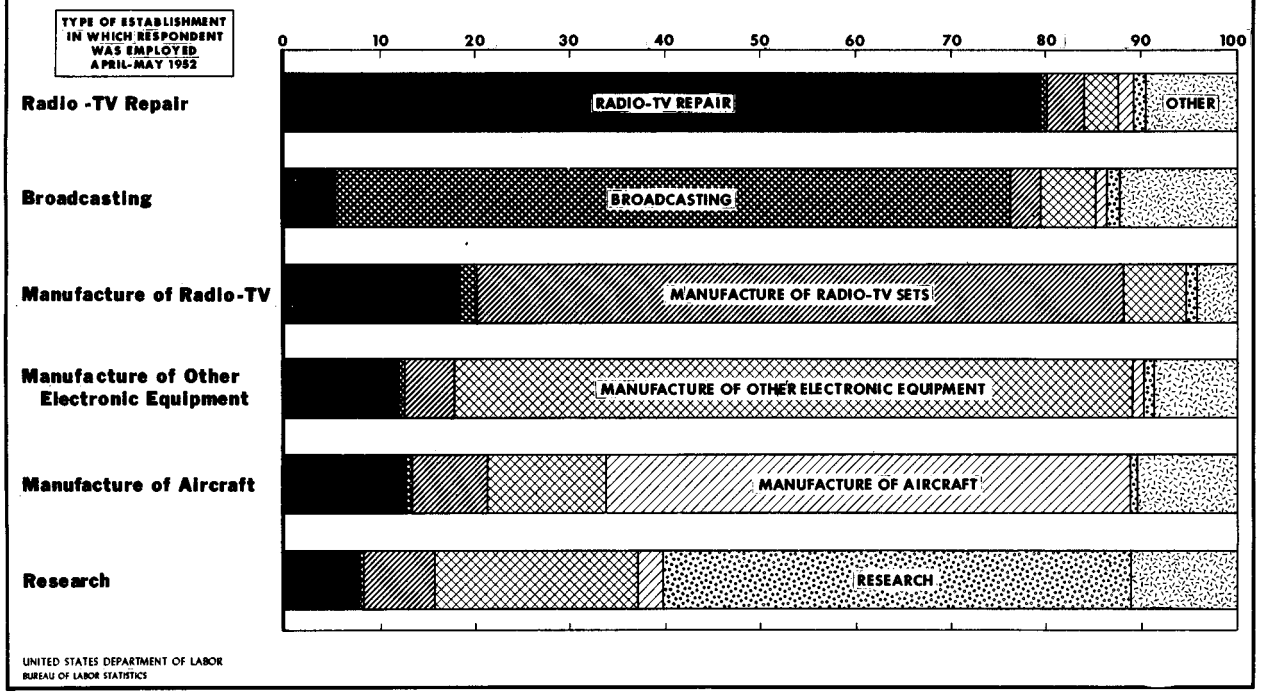


Chart 7. ELECTRONIC TECHNICIANS MOVED FREELY AMONG THE SIX TYPES OF ESTABLISHMENTS

Percent of Electronic Technician Jobs Held by Respondents in Specified Types of Establishments From 1940 to 1952, by Type of Establishment at Time of Survey



Over one-fourth (27 percent) of the men entering civilian electronic technicians jobs over the 12 years obtained them through unsolicited applications at plant employment offices. Another common method (24 percent) was through hearing of openings through relatives or acquaintances working in the plant. Help-wanted ads accounted for about a tenth of the hirings. Among radio repairmen, opening a business of their own was a very common method of getting the "job." Five percent of the jobs resulted from referrals by technical schools.

Changes in Type of Employing Establishment, Job Duties, Employer, and Labor Market Area. The sections of the report which deal with training and skills supply a good deal of evidence for the belief that electronic technicians in the six different types of establishments covered in the survey constitute a valid job group. It might be implied from this fact that electronic technicians working in one type of establishment could move to technicians' jobs in one of the other types of establishments. This section shows to what extent they did make such moves from 1940 to 1952. Chart 7 shows the extent to which electronic technicians employed in each of the six types of establishments in April-May 1952 had worked in each of the six types of establishments over the 1940-52 period.

Electronic technicians moved freely among the different types of electronics establishments between 1940 and 1952. Radio and television repairmen had the least varied background in terms of the percentage of their 1940-52 electronic technician jobs that were in other types of establishments. Electronic technicians in research had had the highest proportion (51 percent) of electronic technicians jobs in other fields, with the aircraft manufacturing group a close second (45 percent). In the other three groups--radio and television manufacturing, other electronics manufacturing, and broadcasting--only about 30 percent of the respondents' jobs as electronic technicians over the 12 years were in other fields.

Past experience in radio and television repair was common among men working in other types of establishments at the time of the survey. Jobs in other electronics manufacturing and radio and television manufacturing also appeared frequently in the work histories of men working in other fields. On the other hand, experience in broadcasting stations, aircraft plants, and research laboratories was relatively rare among technicians not working in those fields. In the case of broadcasting, this may be due to the fact that the electronic technicians in this field were relatively well paid, and tended to remain in this field after they had entered it. As for electronics experience in aircraft manufacturing and research laboratories, its rarity in the work histories of technicians in other types of establishments is a result of the very recent development and expansion of these fields.

To what extent had electronic technicians employed in one activity in April-May 1952 performed other job duties in electronic technician jobs from 1940 to 1952? Chart 8 compares the main job duties performed by the workers in each type of establishment at the time of the survey with their main job duties in all the electronic technician jobs they held over the 12 years.

Electronic technicians performed a wide variety of job duties from 1940 to 1952. Although those in radio and television repair and manufacturing in April-May 1952 had held jobs which were very similar to their current jobs in terms of functions, many men in the other groups had done a number of different kinds of electronic work over the 12 years. For example, of all the jobs held by the broadcasting group over the 12 years, 6 percent involved radio and television receiver repair, and 5 percent involved research laboratory work. Similarly, over 12 percent of the jobs held during the 12 years by men in the other electronics, aircraft manufacturing, and research groups were mainly concerned with the repair of radio and television sets

These findings suggest that radio and television repair work was often a first job in which respondents acquired experience and skill and then moved into the other electronics specializations. On the other hand, very few technicians moved out of broadcasting stations into jobs in other fields.

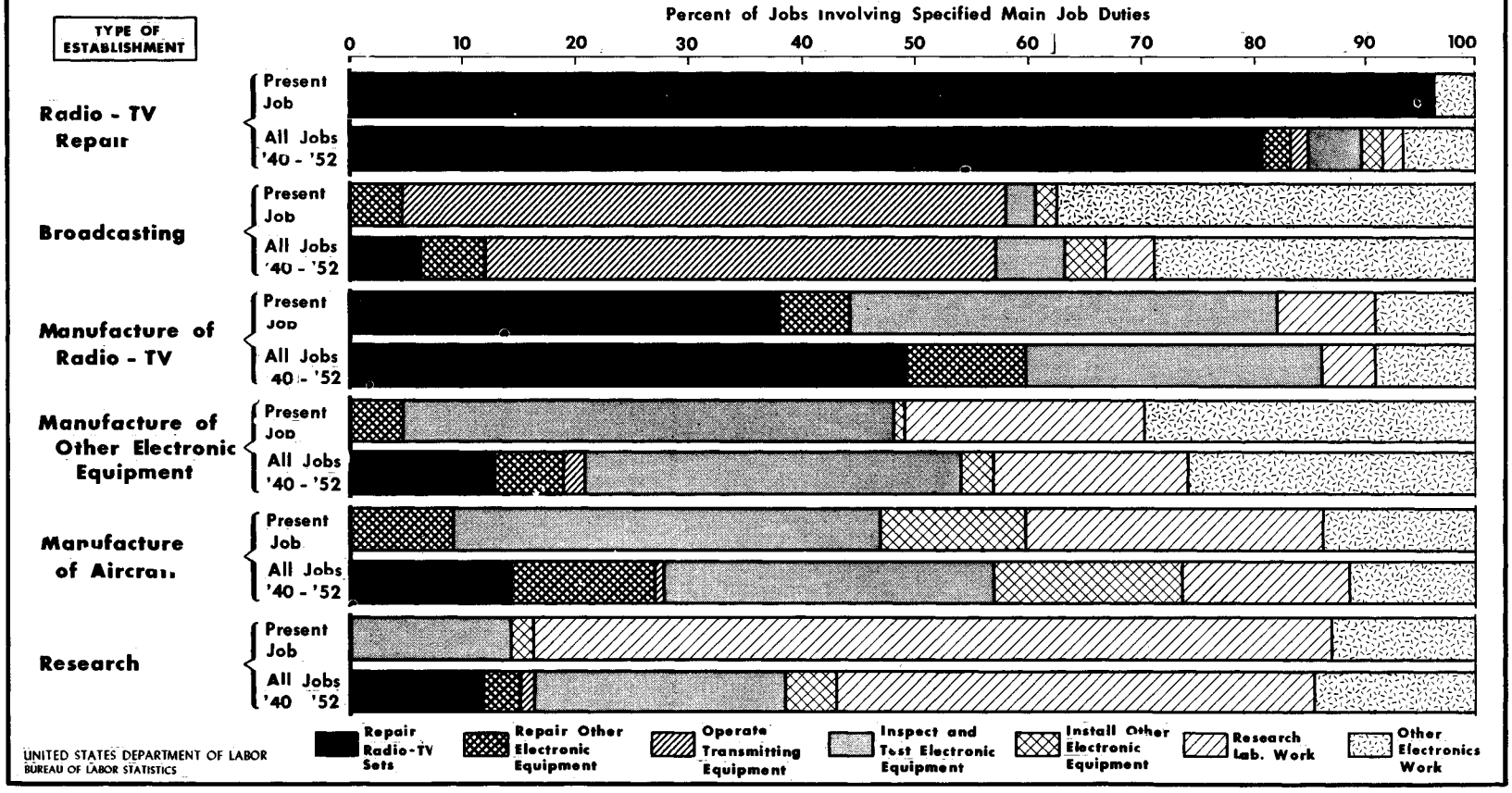
The identity of the employer is one of the factors involved in a job change which must be examined before the significance of the movement can be fully evaluated. The survey shows that most of the electronic technician jobs entered by the respondents from 1940 to 1952 represented a move to a new employer; only in one-eighth of the cases did the respondent return to an employer for whom he had worked previously. A few of these men merely returned to their previous employer after service in the Armed Forces.

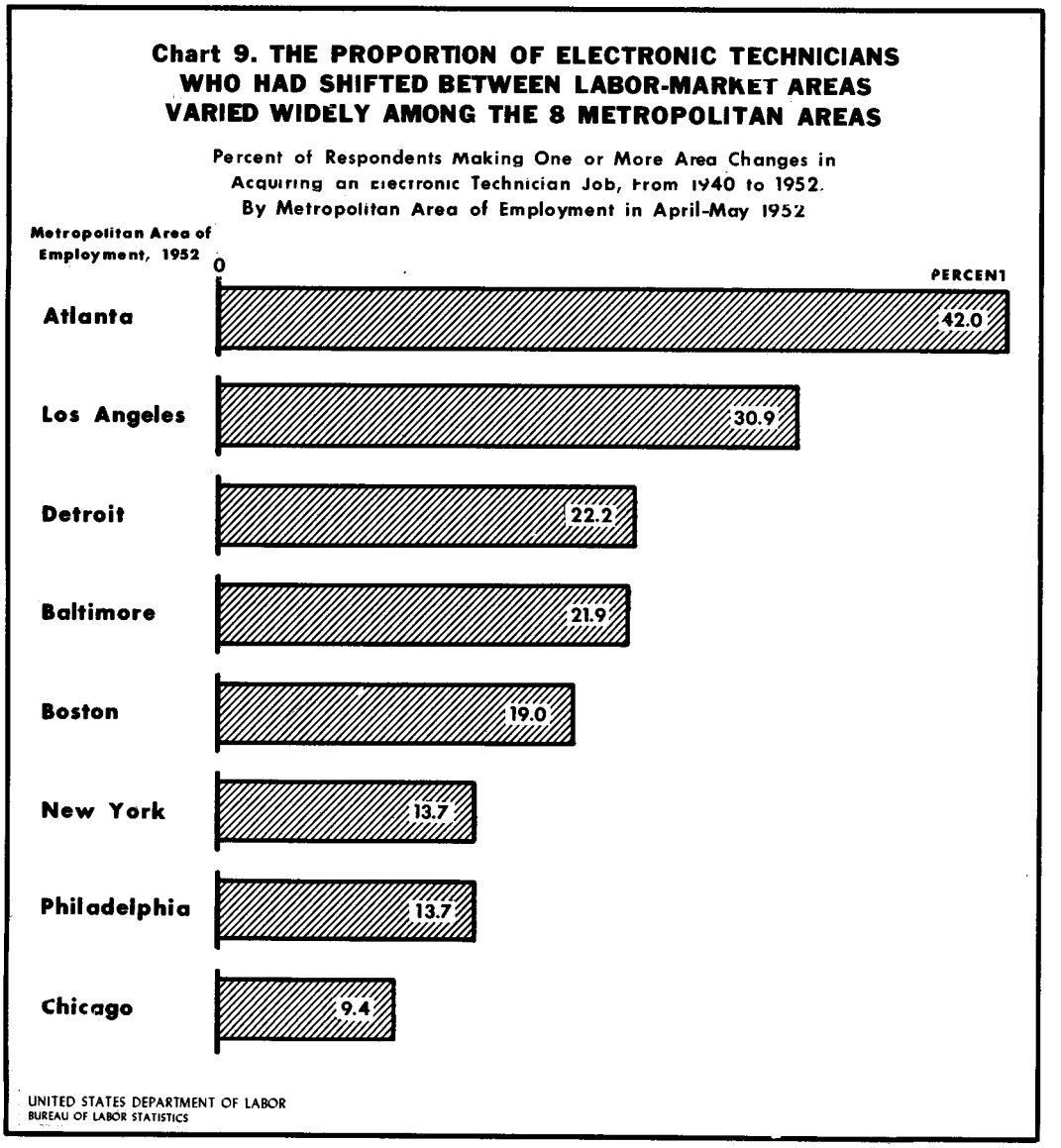
Some information about the extent of movements of electronic technicians between labor market areas is essential to the evaluation of the supply of electronic technicians in relation to the demands for them in specific localities. Geographical moves made in connection with taking an electronic technician job are analyzed here. How many of the movements into electronic technician jobs made by respondents over the 12 years involved changes in labor market areas? How many respondents in each city had made these moves?

In this analysis, a geographical shift is defined in a movement into or out of the 8 metropolitan areas in which the survey was conducted or between states where none of these 8 areas was involved. Thus the actual amount of movement between different labor market areas is slightly understated because of exclusion of movements that occurred between two labor market areas located in the same State, neither of which was one of the survey areas. This exclusion does not significantly affect the validity of the

Chart 8. CURRENT JOB DUTIES OF ELECTRONIC TECHNICIANS COMPARED WITH THE KINDS OF ELECTRONICS WORK THEY HAD DONE PREVIOUSLY

Main Job Duties of Current Jobs (April - May 1952) Held by Electronic Technicians in Each Type of Establishment Compared With Their Main Duties in All Electronics Jobs They Held From 1940 to 1952





geographical data because such intrastate movements were rare. Shifts of electronic technicians out of the 8 metropolitan areas are also understated by the survey data because of the fact that the men who moved out of these areas during the 12-year period and were not working in any of them in 1952 are not covered in the survey.

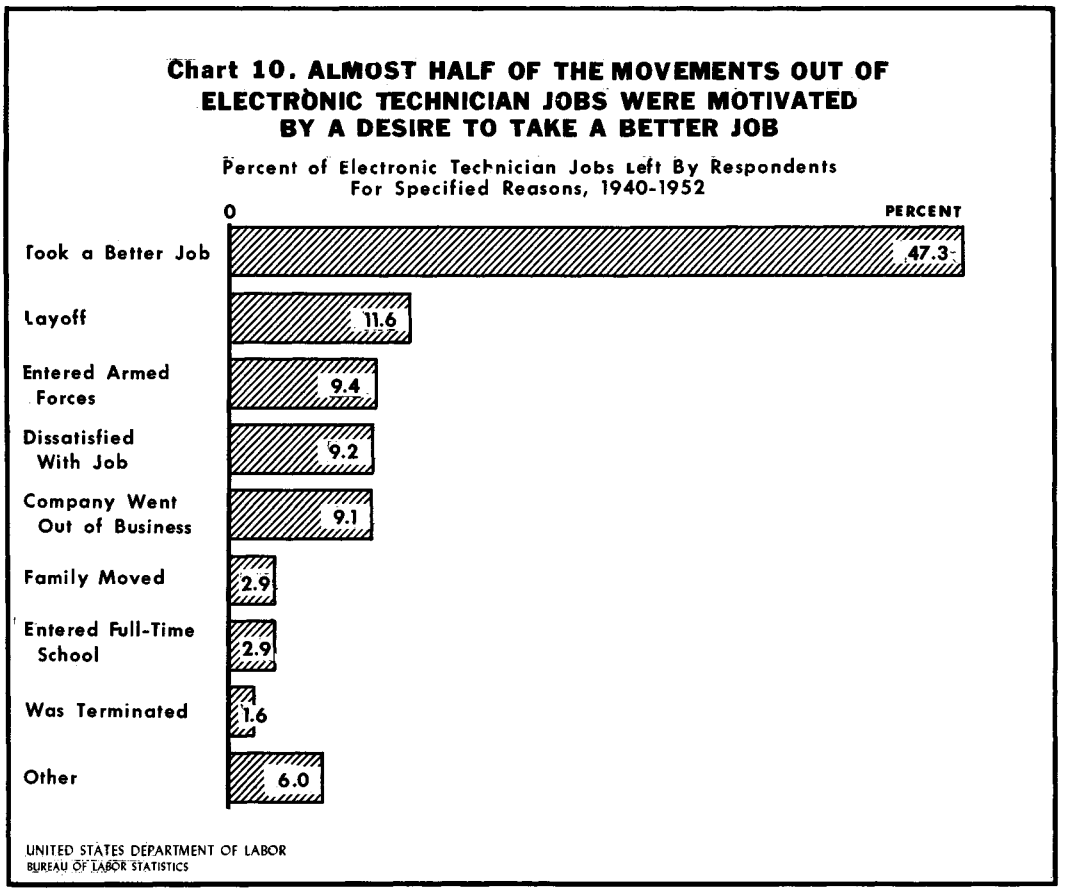
The survey shows that about one-eighth of the movements of respondents into electronic technician jobs from 1940 to 1952 involved a change in labor market area. These area shifts were made by one-fifth of the respondents, with 12 percent making one shift, 5 percent making 2 shifts, and 3 percent making 3 to 5 area shifts.

Respondents who were working in Atlanta and Los Angeles at the time of the survey had made the highest proportion of area shifts, while those in Chicago, New York, and Philadelphia had made the lowest proportion of area shifts (chart 9).

Causal Factors in Electronic Technician Job Changes. The causes of job changes were analyzed in several ways. First the data were examined to determine the relative strength of objective labor market conditions and personal motivations in bringing about job changes. Then the reasons given by the men for changing jobs were analyzed for significant motivation patterns. Finally, the personal characteristics of the men who made job changes were compared to those of the men who made no changes to determine the influence of these characteristics on mobility.

The job changes made by electronic technicians over the 12-year work-history period have resulted from the interplay of two forces--the needs of industry and the desires of the individuals to change their jobs. The relative importance of the two factors was evaluated by studying the annual rate of job shifting among electronic technician jobs in each of the 12 years covered by the work history. If the objective factor--the varying needs of employers for electronic technicians--is the major cause of job changing, it would be likely that the annual rate of job changing would vary irregularly from year to year, being highest in times of industrial expansion, and lowest in times of relatively stable economic conditions. The survey data support this view (chart 1 on page 7). The conclusion may therefore be drawn that the major force bringing about job changes was the pull of the labor market.

Granting that the respondents as a group changed jobs in response to labor market conditions, the next problem is to determine why the particular individuals who changed jobs did so. The personal or psychological motivations for job changing were approached directly by asking the job changers to give their main reason for leaving the 2,786 electronic technician jobs which they left from 1940 to 1952. Analysis of the replies shows that the most common reason (47 percent) was to take another job which they considered better in terms of pay, working conditions, prospect of advancement, etc., (chart 10). Nine percent of the changes were made because of dissatisfaction with the present job.



Job movements influenced by factors over which the respondents had relatively little control were less important. Twelve percent of the jobs were left because of layoffs, and 2 percent were due to firings. The role of the individual was less clear in the case of the jobs which were left because the "company went out of business;" of the 9 percent of jobs left for this reason, many were cases in which electronic technicians closed their own repair businesses.

In 3 percent of the cases men left jobs because their families moved to another area. Nine percent of the jobs were left by men entering the Armed Forces, and 3 percent by men entering full-time school.

An indirect method of analyzing the forces motivating men to change jobs is to study their personal characteristics in relation to those of men in the same worker group who do not change jobs. For example, if young workers move more often than older workers, then age is a factor affecting mobility. Such an approach is rather difficult to apply because it requires that all other factors that might affect frequency of job changing be eliminated before any given personal factor can be studied.

The main influencing factor--industrial requirements--would have to be removed to prevent giving equal weight to movements made under widely varying external pressures. For instance, chart 9 shows that 1942 was a year in which a high proportion of the electronic technicians who could move between jobs did so. Thus any analysis of the total job changing over the 12 years covered by the survey in terms of personal characteristics would overweight the characteristics of the respondents who were working as electronic technicians in 1942. While the 12-year experience could have been used for this analysis, it would be extremely cumbersome because of the complex weighting system that would be required.

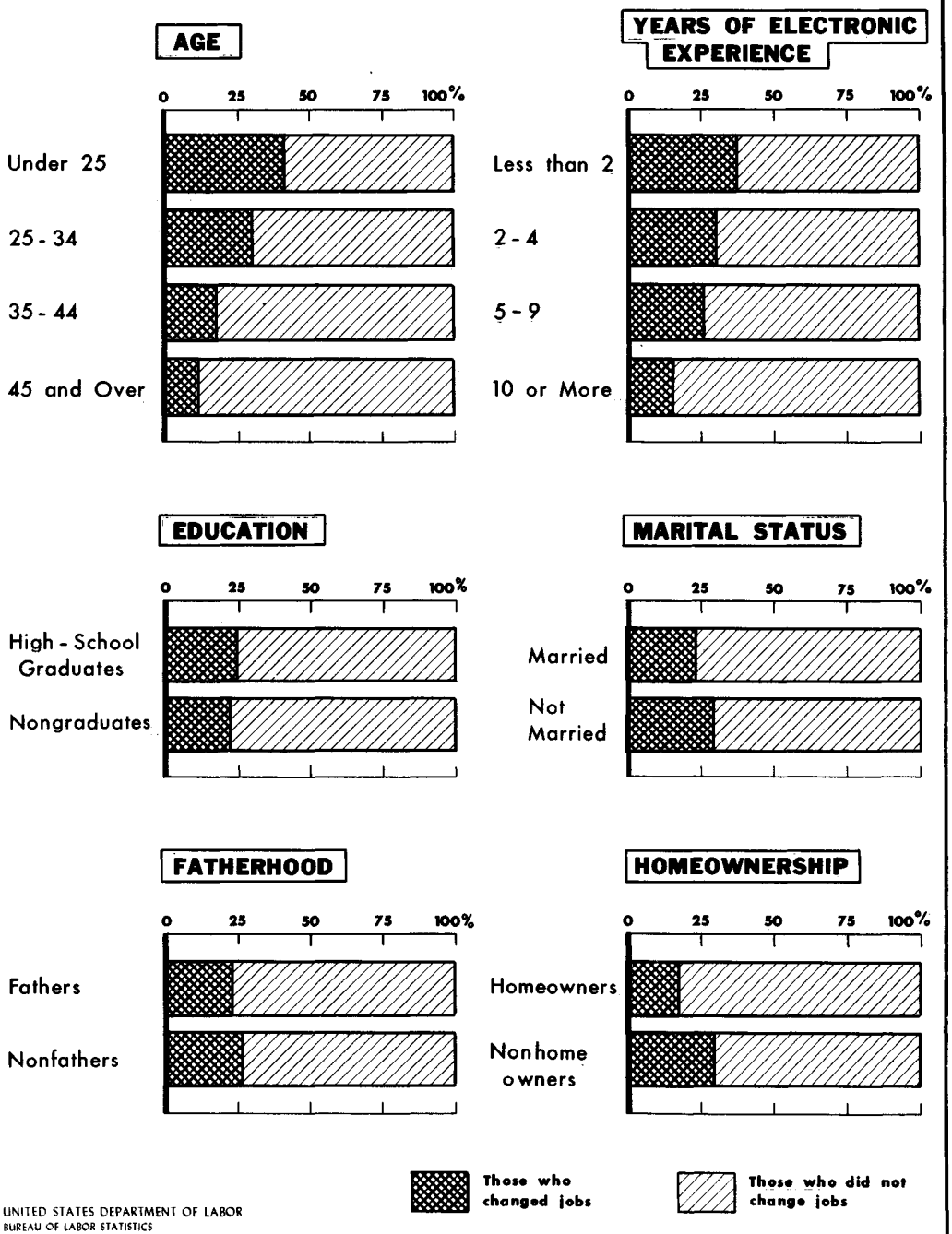
Other factors prevented use of the 12-year experience for testing the effect of personal characteristics in job changing. So few of the respondents (25 percent) were working as electronic technicians in January 1940, and so many of them left the field temporarily during the following 12 years that the determination of the identity and characteristics of the men who were actually working in the field each year and thus could have moved, would be too complex and obscure to present. In addition, the movements of new men into first electronic technician jobs made up a large proportion of all movements in relation to these jobs in most of the 12 years. These considerations led to the development of a simpler method of testing personal factors in job changing.

All respondents working as electronic technicians from January 1951 to April-May 1952 were divided into two groups: Those who had made moves between electronic technician jobs during this period, and those who had not (chart 11). The personal characteristics of these groups--the "movers" and the "non-movers"--were then analyzed for any significant differences. This method was most feasible because it dealt with a short period in which few changes in the characteristics of the respondents occurred, and in which the number of direct movements made between electronic technician jobs was sufficiently large to support analysis.

Age was the main personal characteristic affecting mobility. The only other significant differences between the men who changed jobs from January 1951 to April-May 1952 and those who did not were in number of years of experience as an electronic technician and home-ownership. Those who changed jobs

Chart 11. THE CHARACTERISTICS OF RESPONDENTS WHO CHANGED JOBS

Comparison of Electronic Technicians Who Made One or More Job Changes and Those Who Made No Job Changes From January 1940 to April - May 1952



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were younger, they included a lower proportion of home owners, and they had fewer years of experience in electronics.

Though job changers included a lower proportion of married men and fathers, and a slightly higher proportion of high school graduates, these differences can be attributed to age and other factors. No direct influence of marriage, fatherhood, or education on job changing is apparent in the findings.

Electronic technicians who changed jobs were more likely to do so during their first year or two in the field. However, after 2 or 3 years of experience, they did not change much in their propensity to move between jobs; for example, men with 5 years of experience were only slightly less mobile than those with 10 years of experience.

THE PEOPLE WHO ENTERED THIS OCCUPATION

Personal Characteristics

From the standpoint of labor mobility, one of the most significant aspects of a new occupation such as electronic technician is the type of people who obtained such jobs. Were they people who moved directly into electronics from high school or technical school? Were they older or younger than workers in established industries? Were many of them women? Were they people who showed special aptitudes for this type of work? How well educated were they?

Less than six-tenths of one percent of the technicians surveyed were women. This extremely low participation by women is due more to their lack of appropriate educational background than to the physical requirements of the work or discrimination by employers. Very few, if any, girls take the vocational or mechanical arts curriculum in high school. The girls who take the academic course are usually preparing for college and do not concentrate on technical or scientific subjects such as mathematics and physics. Most girls who do not plan on college take the commercial course, which does not provide an adequate mathematical background for electronics.

Most of the respondents took their first full-time jobs as electronic technicians when they were young men. More than one-fourth of them entered their first electronic technician jobs before they were 20 years old, and almost all of them (94 percent) entered before they were 35. Their median age at the time they entered electronics was 23.

Table 1.--Education Completed by Respondents, by Type of Establishment

Regular school	All establishments		Type of establishment											
			Radio-tv repair		Broadcasting		Manufacture of radio-tv		Manufacture of other electronic equipment		Manufacture of aircraft		Research	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	1,926	100.0	1,017	100.0	354	100.0	79	100.0	197	100.0	132	100.0	147	100.0
0 - Below 8th grade	32	1.7	26	2.6	3	.8	--	--	2	1.0	--	--	1	.7
1 - 8th to 11th grade	421	21.9	272	26.7	34	9.6	18	22.8	42	21.3	25	18.9	30	20.4
2 - Graduated high school	962	49.8	511	50.3	168	47.5	46	58.2	103	52.4	68	51.6	66	44.9
3 - Some college	401	20.8	167	16.4	118	33.3	12	15.2	32	16.2	33	25.0	39	26.5
4 - Graduated from college	90	4.7	37	3.6	24	6.8	1	1.3	16	8.1	6	4.5	6	4.1
5 - Graduate work	19	1.0	4	.4	6	1.7	2	2.5	2	1.0	--	--	5	3.4
J - Not reported	1	.1	--	--	1	.3	--	--	--	--	--	--	--	--

Table 2.--Number of Respondents Reporting Specified Types of Job Arrangements, by Type of Establishment, April-May 1952

Job arrangement	All establishments		Type of establishment											
			Radio-tv repair		Broadcasting		Manufacture of radio-tv		Manufacture of other electronic equipment		Manufacture of aircraft		Research	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	1,926	100.0	1,017	100.0	354	100.0	79	100.0	197	100.0	132	100.0	147	100.0
0 - Work independently	820	42.6	550	54.1	83	23.5	39	49.4	77	39.1	26	19.7	45	30.6
1 - Supervise others doing electronic work	277	14.4	158	15.5	52	14.7	11	13.9	21	10.7	21	15.9	14	.9.5
2 - Act as helper to higher grade man	111	5.7	39	3.8	4	1.1	7	8.9	16	8.1	7	5.3	38	25.9
3 - Work in a crew with other technicians at the same grade	676	35.1	249	24.5	209	59.0	22	27.8	78	39.6	72	54.5	46	31.3
4 - Other	42	2.2	21	2.1	6	1.7	--	--	5	2.5	6	4.6	4	2.7

Three out of 4 electronic technicians graduated from high school, and 1 out of 4 had had some college training (table 1). Less than 2 percent of them left school before the eighth grade. At the upper end of the scale there were 6 percent who were college graduates. This group included 1 percent who had done graduate work. In addition to the education covered in this section, many respondents also had training in technical schools, which is described in the section on electronics training.

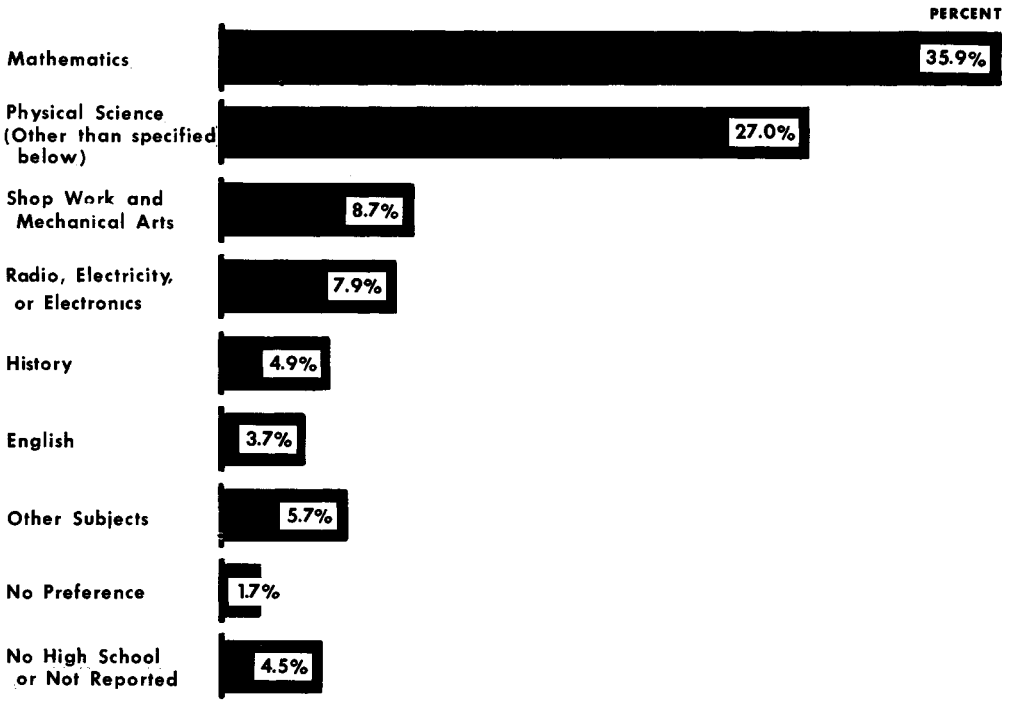
The relatively high educational attainment of electronic technicians in comparison with other skilled trades is partly attributable to the fact that they were young. The average number of years of school completed by American youth has steadily increased over the years. GI bill benefits after World War II made college and technical school training available to millions of veterans, and raised even higher the average educational attainment.

The survey also showed a relationship between formal education and type of establishment in which the technician was employed. One-third of the technicians in broadcasting had had college work, while only about one-sixth of those in radio-television repair and radio-television and other electronic equipment manufacturing had had any college. About one-fourth of those in research and aircraft manufacturing reported some college work. The proportion of college graduates was high among the technicians employed in manufacturing other electronic equipment (8 percent) and in broadcasting (7 percent). Only one college graduate was in the group employed in manufacturing radio-television receivers.

To gain some insight into what might be called the field of interest or "bent" of these men before they entered the labor market, they were asked "What was your favorite high school subject?" The responses (chart 12) indicate that the men who became electronic technicians can be differentiated from other workers by the fields of knowledge in which they had shown the most interest in high school. The survey disclosed that 36 percent of the technicians preferred mathematics to all other subjects. A strong preference for the general field of physical science is evidenced by the fact that 35 percent mentioned one of the physical sciences (physics, radio, electricity, electronics, chemistry, etc.) as their favorite subject. The next largest group, 9 percent of the technicians, preferred shop work or mechanical arts. Thus, about 8 out of 10 of the men who became electronic technicians favored high school subjects whose mastery is closely related to successful work in the electronics field.

Chart 12. MATHEMATICS AND THE PHYSICAL SCIENCES WERE FAVORITE HIGH SCHOOL SUBJECTS OF ELECTRONIC TECHNICIANS

Percent of Respondents Who Preferred Specified High School Subjects



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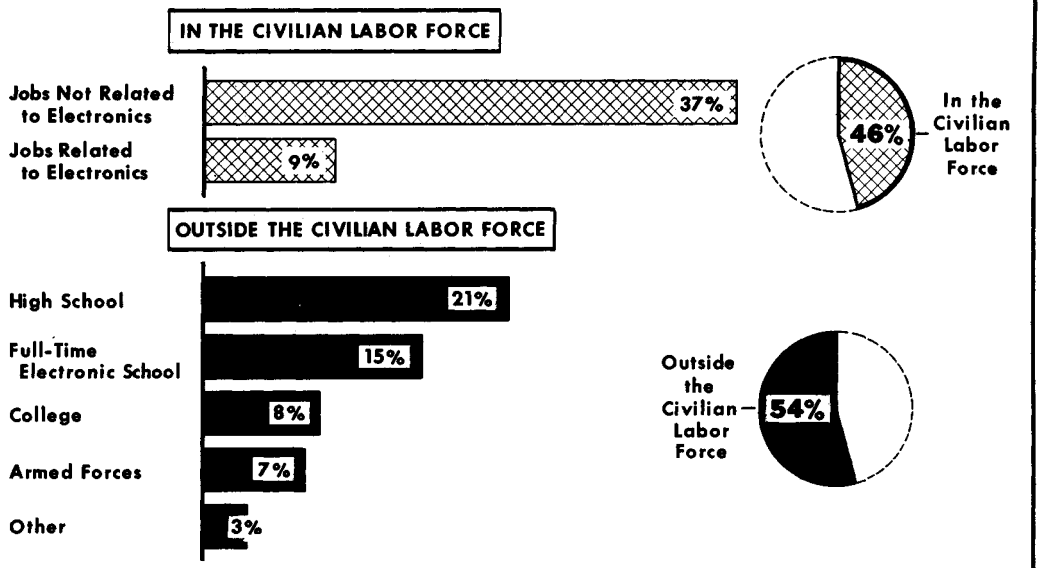
Activities or Occupations From Which They Came

One of the objectives of the survey was to determine the fields of activity from which men move into jobs in electronics. More than 50 percent of the respondents, the survey shows, were engaged in activities outside the labor force immediately before they became electronic technicians (chart 13). About 21 percent were attending high school just before they entered their first electronics job, 15 percent were studying electronics at technical schools, 8 percent were attending college, and 7 percent were serving in the Armed Forces.

Chart 13. MORE THAN HALF OF THE RESPONDENTS CAME INTO THE ELECTRONICS FIELD DIRECTLY FROM SCHOOL OR THE ARMED FORCES

Percent of Respondents Engaged in Specified Activities Before Entering Their First Electronic Technician Job



The previous occupations of the 45 percent who came into electronics work directly from other jobs can be classified roughly as jobs related to electronics and jobs not related to electronics. About 9 percent of the technicians were in the first group, which included jobs like electrician, radio parts salesmen, and electrical appliance repairman. The remaining 36 percent were employed in a wide variety of other types of jobs.

Why They Entered Electronics

The reasons why people choose a particular field as their life's work are difficult to ascertain and evaluate. On the one hand, the fact that jobs available in one's particular locality involve minimum social dislocation and offer immediate income tends

to draw workers into such jobs. On the other hand, the individual's educational and social background, psychological makeup, and long-run career and income objectives influence him to seek a particular kind of job, regardless of whether such jobs are available at the particular time and place.

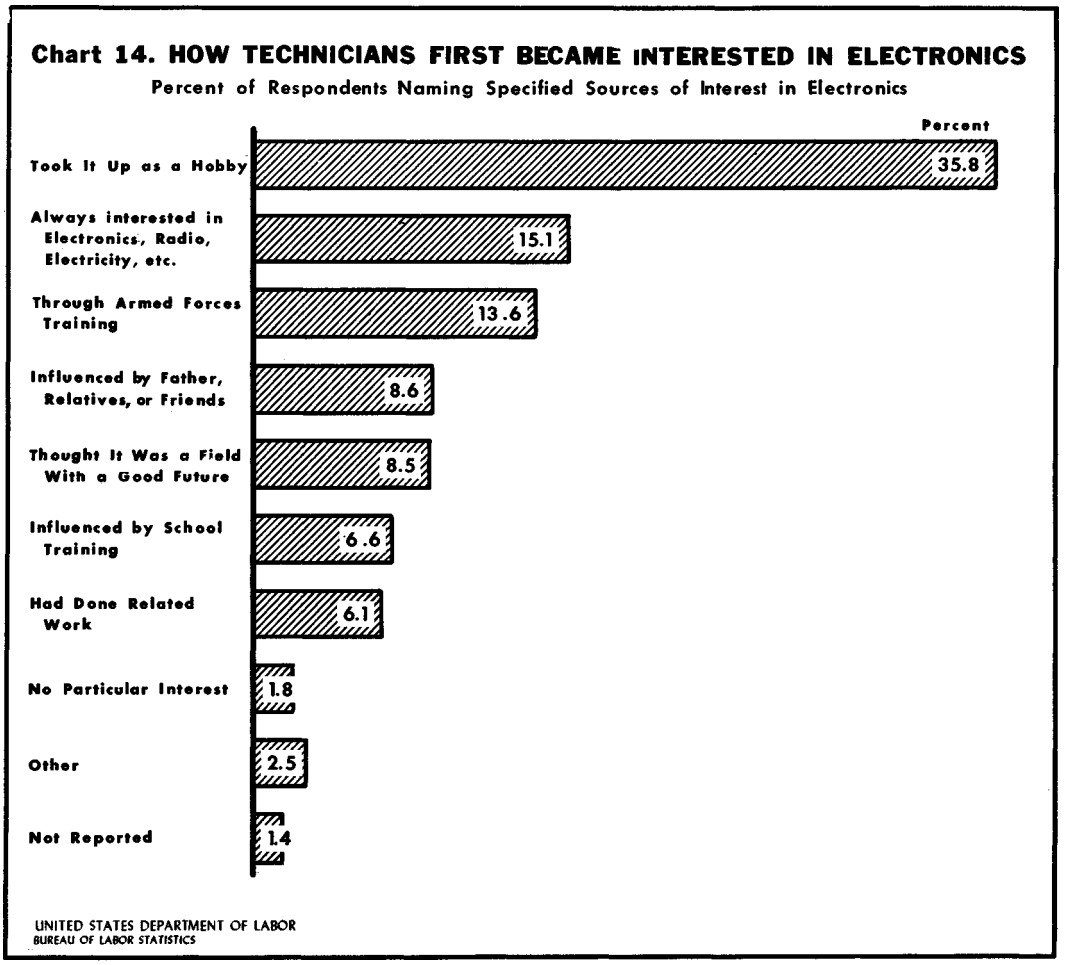
When jobs are scarce and unemployment is widespread, the heavy pressures on workers to earn any income they can tends to make the long-run, personal preference aspect of job-choosing almost completely inoperative, especially in the case of men with family obligations. Conversely, prosperous conditions give the worker a much wider range of jobs from which to choose and a much greater opportunity for indulging preferences for certain types of work. If he wants a job that requires special training, the fact that other members of his family are working may enable him to defer his entrance into the labor market while undergoing training.

The survey made only one direct attempt to determine the motivations underlying the respondents' entrance into the electronics field. The question asked was, "How did you happen to become interested in electronics?" The phrasing of this question was designed to get at the earliest forces operating to influence the individual's choice of electronics as a career.

The most striking fact about why electronic technicians entered this field is that a very high proportion, 51 percent, became interested in electronics long before they even thought seriously about the kind of work they wanted to do (chart 14). Of these, 15 percent said that they had been interested in electronics since early youth. Typical answers were: "I was always interested in radio;" "I was interested in it since I was child;" or "I always liked radio." Hobby work was mentioned specifically by 36 percent, for example: "I became interested in it as a hobby;" "I was a ham operator and had radio as a hobby;" "It began as a hobby in elementary school;" or "I had it as a hobby since I was 8 years old."

Another sizable group, 14 percent, entered electronics because they were assigned and trained in this field while in the Armed Forces. A typical response was, "I was a radar mechanic during the war."

The influence of families or friends was cited by 9 percent of the technicians as the main factor directing them toward electronics. For instance, "I got interested through a friend who was a ham," or "Through an acquaintance, I became very interested in the trade," or "My dad and brother were both electronic technicians, so I just naturally got interested in the field."



About 9 percent of the group entered electronics primarily because they thought it offered favorable opportunities for a successful career. As one man said, "It looked like an up and coming field with a good future."

Only about 6 percent attributed their interest in electronics to their previous experience in jobs related to electronics, such as electrician or radio parts salesman.

A very small proportion--less than 2 percent--said that their entering this field was accidental--that they "just drifted into electronics."

It is important to note certain facts about the labor market conditions at the time these workers entered their first electronics jobs. More than two-thirds of the technicians entered the field after 1939. The years following 1939 have been characterized by high employment levels and, consequently, favorable conditions for the exercise of personal preference in job-choosing. It is, therefore, not surprising that most of the men who entered this field did so by choice.

HOW ELECTRONIC TECHNICIANS WERE TRAINED

The methods by which untrained men can become qualified skilled workers have direct implications for effective manpower mobilization. The survey therefore attempted to ascertain how the men now employed as technicians acquired their skill in electronics.

The survey indicates that there was no set pattern of training among electronic technicians. Most of the respondents acquired their skills through two or more different kinds of training.

There was a marked similarity in the relative importance of particular training methods among the six groups covered. The most common type of training among every group of electronic technicians was full-time electronics training in a civilian technical school (chart 2 on page 10). Fifty-six percent of all the technicians attended such schools, with the proportion among groups ranging from 72 percent for those employed in the radio and television manufacturing group at the time of the survey to 45 percent in other electronics manufacturing group. Armed Forces technical schools were attended by 34 percent of the electronic technicians. Over one-fourth (26 percent) of the technicians attended part-time technical schools, with the proportion highest in research (35 percent), and lowest in aircraft manufacturing (20 percent).

Training in the plant consisted of apprenticeship and other less formal on-the-job training programs. Five percent had been through apprenticeship programs and 13 percent had had other on-the-job training.

The most unusual fact about the training of electronic technicians was that a great many of them acquired some of their skills at home. As noted earlier, radio and electronics was a hobby of many of these men. Operating an amateur "ham" radio station as a hobby was mentioned by 35 percent of the electronic technicians in broadcasting as part of their training, and by 14 percent of all the electronic technicians. Other hobby work was reported by 40 percent of the technicians. About 23 percent took

correspondence courses in electronics, and 18 percent gained some of their electronics knowledge through home study and reading.

How much time did the above training consume? Most of the technicians who attended full-time civilian technical schools took courses lasting 12, 18, or 24 months. However, a few spent 3 years and more in technical school. Armed Forces schools usually had shorter courses lasting 6 or 12 months, although a few courses ran 18 months or longer. The length of time electronic technicians spent in part-time technical schools varied from 1 month to over 3 years, but most courses lasted 6 or 12 months. On-the-job training was also most commonly of 6 or 12 months duration, though some programs lasted 24 months and more.

ELECTRONIC TECHNICIANS IN 1952

The characteristics of the existing supply of electronic technicians must be understood before accurate predictions of their labor force behavior can be made. This section discusses the findings which describe the personal characteristics, jobs, and electronic skills of electronic technicians as of the time of the survey, April-May 1952.

Personal Characteristics

Certain personal characteristics of workers have a direct bearing on their future supply and their tendency to change job statuses. Most important of these are age, marital status, number of dependents, housing arrangement, and veteran or reserve status.

Electronic technicians, the survey shows, were a very young group of skilled workers (see chart 3 on page 10). Over half of them were between the ages of 25 and 34, and less than 3 percent of them were over 54 years of age. This contrasts with the age distribution of the nonagricultural male labor force at the same time (April 1952), where only one-fourth were between 25 and 34, and 18 percent were over 54.

Electronic technicians working in plants manufacturing radio and television receivers and in research laboratories were a little younger than those in the other groups. Their median age was 30, as compared with 33 for those in radio and television repair, other electronic manufacturing, and aircraft manufacturing. The highest median age, 34, was found in the broadcasting group, which had 15 percent of its technicians in the age group 45 to 49, compared with an average of 8 percent for all groups.

More than four-fifths of the electronic technicians were married, reflecting the high marriage rates during World War II and the postwar period; about three-fourths of the married men were fathers. About 83 percent had one or more dependents in addition to themselves.

The marked trend toward home-ownership shown in recent censuses is apparent in the survey results, which show that 42 percent of the electronic technicians owned their own homes in 1952. About one-third of them rented apartments, 8 percent rented houses, and about 12 percent resided in their parents' homes.

The proportion of home owners varied from 57 percent in the broadcasting group to 19 percent in the radio-television manufacturing group. For the other groups, the figures were: 52 percent in aircraft manufacturing; 39 percent in radio-television repair; 38 percent in research; and 38 percent in other electronics manufacturing.

About 62 percent of the electronic technicians were veterans of World War II. Over half of these veterans served in the Army, and 14 percent were in the Army Air Force. Twenty-seven percent had been in the Navy, 3 percent in the Marine Corps, and 1 percent in the Coast Guard.

Eight percent of the technicians belonged to a military reserve. This group includes veterans of World War II and some younger men who either were in the Armed Forces during the post-war period or who joined a reserve with previous service.

Current Job Duties, Earnings, Hours, and Tenure

Many aspects of the jobs which electronic technicians hold are related to the general problem of planning an adequate supply of these workers. The kinds of work they do, their work organization arrangements, the way they are paid and the amount they earn, the number of hours they work, their length of service in the plant--all these factors aid in evaluating the adequacy of the present supply in relation to future needs.

The findings show that the characteristics of jobs held by electronic technicians varied greatly by type of establishment. Those working in radio and television repair, broadcasting, and research showed greater homogeneity in job duties within their group than did the others.

As expected, practically all the electronic technicians in radio-television repair shops were engaged in repairing home receivers (see chart 8 on page 33). The main job duty of over half of the technicians in broadcasting was operating transmitting equipment, but 37 percent of them had a combination of different duties such as repairing radio and television transmitting equipment, operating a master-control board, operating and repairing recording equipment, and setting up, operating and repairing remote pickup equipment. Thirty-eight percent of those working in plants manufacturing radio and television sets said they repaired them, while another 38 percent inspected and tested them.

In plants manufacturing other electronic equipment, 44 percent of the technicians reported their main job duty as the inspecting and testing of electronic equipment. About 21 percent of this group did research laboratory work, and a rather high proportion--28 percent--were classified under "other electronics work" because none of the six given categories adequately described their main job duties. Technicians in aircraft manufacturing were engaged mainly in inspecting and testing electronic equipment (38 percent), doing research work (27 percent), and installing electronic equipment (13 percent). About 71 percent of those in research laboratories said they spent most of their time doing research work, while 14 percent reported inspecting and testing electronic equipment as their main job duty.

To provide information on the utilization of the skills of electronic technicians in the different types of electronics establishments, respondents were asked to choose from among four categories the one which best described their present job arrangement. For cases which might not fit any of the categories, an "other (specify)" option was provided. Only 2 percent placed themselves outside the suggested categories (table 2 on page 40).

Working independently was the most common job arrangement in radio and television repair and manufacturing, while working in crews was most common in broadcasting, aircraft manufacturing, and other electronics manufacturing, and research.

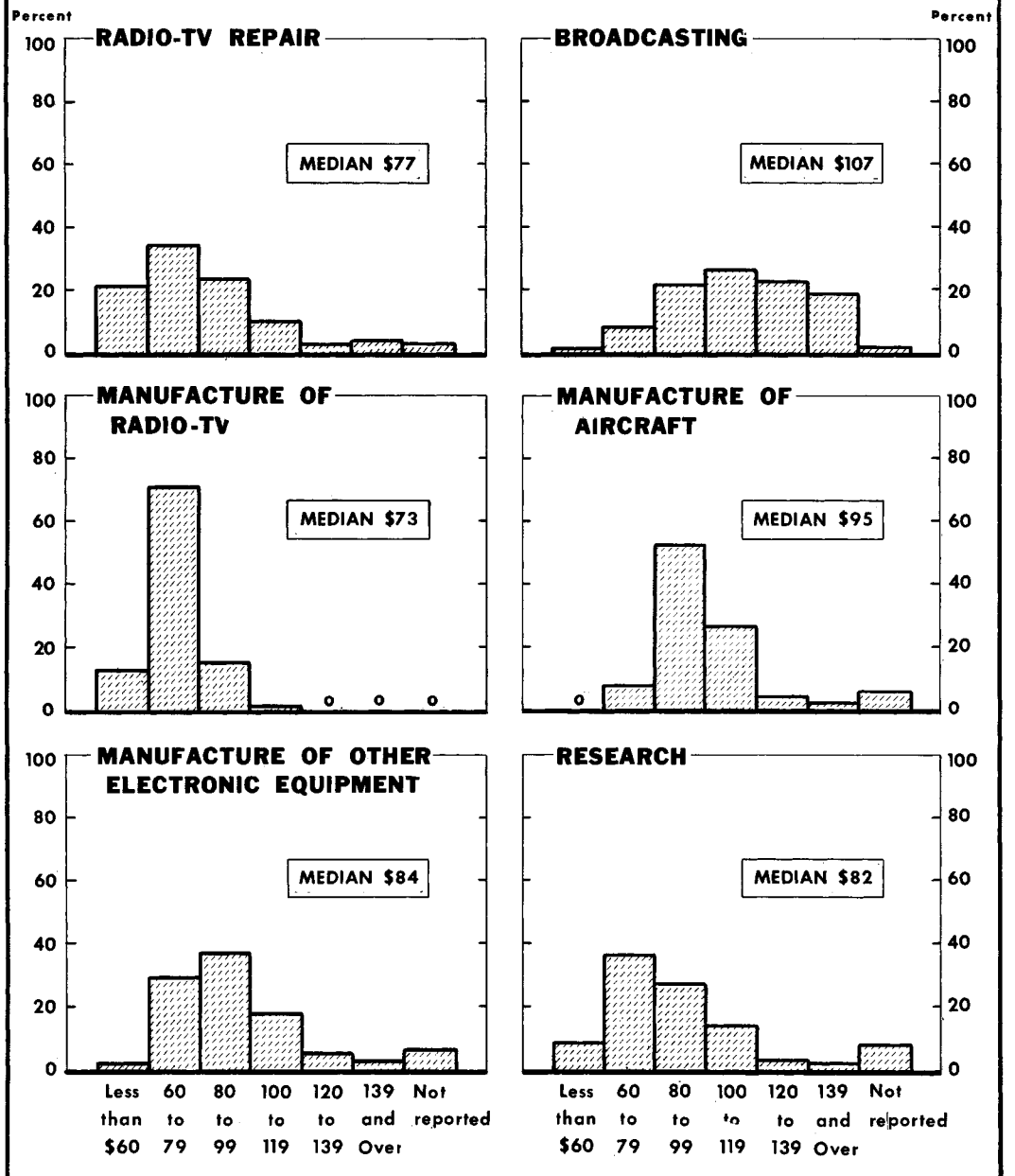
Over half (54 percent) of the technicians in radio and television repair and about half (49 percent) of those in radio and television manufacturing said they worked independently (see table 2 on page 40). Working in a crew with other technicians at the same skill level was the most common job arrangement among those in broadcasting (59 percent), aircraft manufacturing (55 percent), other electronics manufacturing (40 percent), and research (31 percent).

The research group was unique in the high proportion--26 percent--who acted as helpers to higher-skilled men. No other group had more than 9 percent in this category. This variation is due to the fact that a great many technicians in research laboratories work as skilled assistants to professional engineers. Another 31 percent of this group said they worked independently. Working independently also characterized 39 percent of the technicians in other electronics manufacturing and 24 percent of those in broadcasting. These two categories--working independently, and working in a crew--described the job arrangements of over three-fourths of all the men in the survey.

Supervising others doing electronics work was the main function of 14 percent of the respondents, with the proportion ranging from 10 percent in research to 16 percent in aircraft manufacturing.

Chart 15. EARNINGS OF ELECTRONIC TECHNICIANS VARIED WIDELY

Percent of Electronic Technicians in Each Type of Establishment With Specified Average Weekly Earnings and Median Earnings
April-May 1952



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About 38 percent of the radio and television repairmen received earnings in the form of income from their own businesses; 43 percent were salaried (table 3). Hourly wages were earned by most of the electronic technicians engaged in manufacturing radio and television sets and aircraft, and by the majority of those in other electronics manufacturing and in research, but a third of the research group were also salaried. A weekly salary was the most common method of payment in broadcasting.

Electronic technicians paid by the hour were asked the amount of their straight-time hourly rates. Over half of the technicians in aircraft manufacturing who were paid by the hour reported hourly rates of from $2 to $2.24. Over half (53 percent) of those in radio and television manufacturing, 45 percent in other electronics manufacturing, and 28 percent in aircraft manufacturing had hourly rates ranging from $1.75 to $1.99. Over one-fifth of the hourly-rate technicians in broadcasting who were paid by the hour, only 21 percent received under $2.25 per hour and about 12 percent earned $3.25 or more.

The earnings figures presented below are the respondents' best estimates of how much they earned per week, on the average, over the 2 months preceding the interview. Thus they include payment for overtime, and can only be properly evaluated in conjunction with average weekly hours covering the same period. For instance, the pay scale of radio and television repairmen ranks still lower when allowance is made for the longer hours characteristic of this group.

Average weekly earnings were highest among electronic technicians in broadcasting stations 9/, with 71 percent of them earning $100 or more per week (chart 15). At the low end of the earnings scale were those in radio and television manufacturing, 84 percent of whom earned less than $80 per week. In aircraft manufacturing plants, average weekly earnings of most of the electronic technicians were high and had a rather narrow range, with 79 percent of them earning from $80 to $119 per week. Technicians in other electronics manufacturing were third highest in average weekly earnings among the six groups covered. About 54 percent of them earned between $80 and $119 per week, though the earnings of the whole group ranged from below $50 to over $160. In research, earnings also had a wide range, with 75 percent of the technicians earning from $60 to $119 per week.

The radio and television repairmen ranked second from the lowest in average weekly earnings, but their earnings had a very wide range. While no other group had as much as 1 percent of its technicians in the less than $50 per week category, 10 percent of the repairmen were in this group. The earnings of 80 percent of the repairmen ranged from $50 to $119 a week.

9/ These earnings are representative of only the stations in large cities. (See page 40).

Table 3.--Type of Earnings Received by Respondents by Type of Establishment

Type of earnings	All establishments		Type of establishment											
			Radio-tv repair		Broadcasting		Manufacture of radio-tv		Manufacture of other electronic equipment		Manufacture of aircraft		Research	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total, all types ---	1,926	100.0	1,017	100.0	354	100.0	79	100.0	197	100.0	132	100.0	147	100.0
0 - Income from own business ---------	393	20.4	393	38.6	--	--	--	--	--	--	--	--	--	--
1 - Salary ------------	800	41.5	433	42.6	257	72.5	5	6.3	51	25.9	4	3.0	50	34.0
2 - Hourly rate --------	702	36.4	162	15.9	95	26.8	74	93.7	146	74.1	128	97.0	97	66.0
3 - Other -------------	30	1.6	28	2.8	2	.7	--	--	--	--	--	--	--	--
J - Not reported -------	1	.1	1	.1	--	--	--	--	--	--	--	--	--	--

Table 4.--Average Weekly Hours Worked by Respondents by Type of Establishment

Average weekly hours	All establishments		Type of establishment											
			Radio-tv repair		Broadcasting		Manufacture of radio-tv		Manufacture of other electronic equipment		Manufacture of aircraft		Research	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total, all respondents --------	1,926	100.0	1,017	100.0	354	100.0	79	100.0	197	100.0	132	100.0	147	100.0
Less than 35 ----------	40	2.1	34	3.5	1	.3	--	--	1	.5	1	.8	2	1.4
35 - 39 ----------	40	2.1	23	2.3	4	1.1	2	2.5	2	1.0	--	--	9	6.1
40 ----------	697	36.2	194	19.1	252	71.3	59	74.7	74	37.6	39	29.5	79	53.7
41 - 47 ----------	310	16.1	128	12.6	75	21.2	9	11.4	30	15.2	41	31.1	27	18.4
48 ----------	320	16.6	232	22.8	6	1.7	5	6.3	33	16.8	30	22.7	14	9.5
49 - 54 ----------	177	9.2	108	10.6	9	2.5	3	3.8	33	16.8	12	9.1	12	8.2
55 - 59 ----------	68	3.5	36	3.5	3	.8	1	1.3	18	9.1	7	5.3	3	2.0
60 ----------	126	6.5	116	11.4	3	.8	--	--	4	2.0	2	1.5	1	.7
61 - 69 ----------	29	1.5	26	2.5	1	.3	--	--	2	1.0	--	--	--	--
70 and over ----------	119	6.2	119	11.7	--	--	--	--	--	--	--	--	--	--

Three-fourths of the electronic technicians in radio and television manufacturing worked the 40-hour week, and 18 percent of them worked 41 to 48 hours (table 4). The 40-hour week was also the rule in broadcasting, with 71 percent working 40 hours. Most of the technicians in broadcasting who did work more than 40 hours worked only a few hours of overtime. Twenty-one percent of them averaged from 41 to 46 hours, and only 6 percent worked 48 or more hours. Thus the high earnings of this group appear even more attractive when the hours worked are considered. A majority (54 percent) of the electronic technicians in research also worked 40 hours per week. In this group, also, most hours in excess of 40 represent irregular overtime rather than an established longer workweek, though more overtime was worked in research than in broadcasting. Eighteen percent in research worked 41 to 47 hours, 10 percent worked 48 hours, and 11 percent worked longer than 48 hours.

Electronic technicians in radio and television repair had the longest workweek of all the six groups. Twenty-three percent of them worked 48 hours, indicating that the 6-day week is fairly common in this group. Only 19 percent worked 40 hours. A very large proportion--40 percent--worked more than 48 hours, and nearly 12 percent worked 70 or more hours. These hours are not strictly comparable with those in the other groups because they often represent the hours in which a repairman keeps his own shop for business, and they thus include time for lunch or dinner and other activities not directly concerned with repairing equipment.

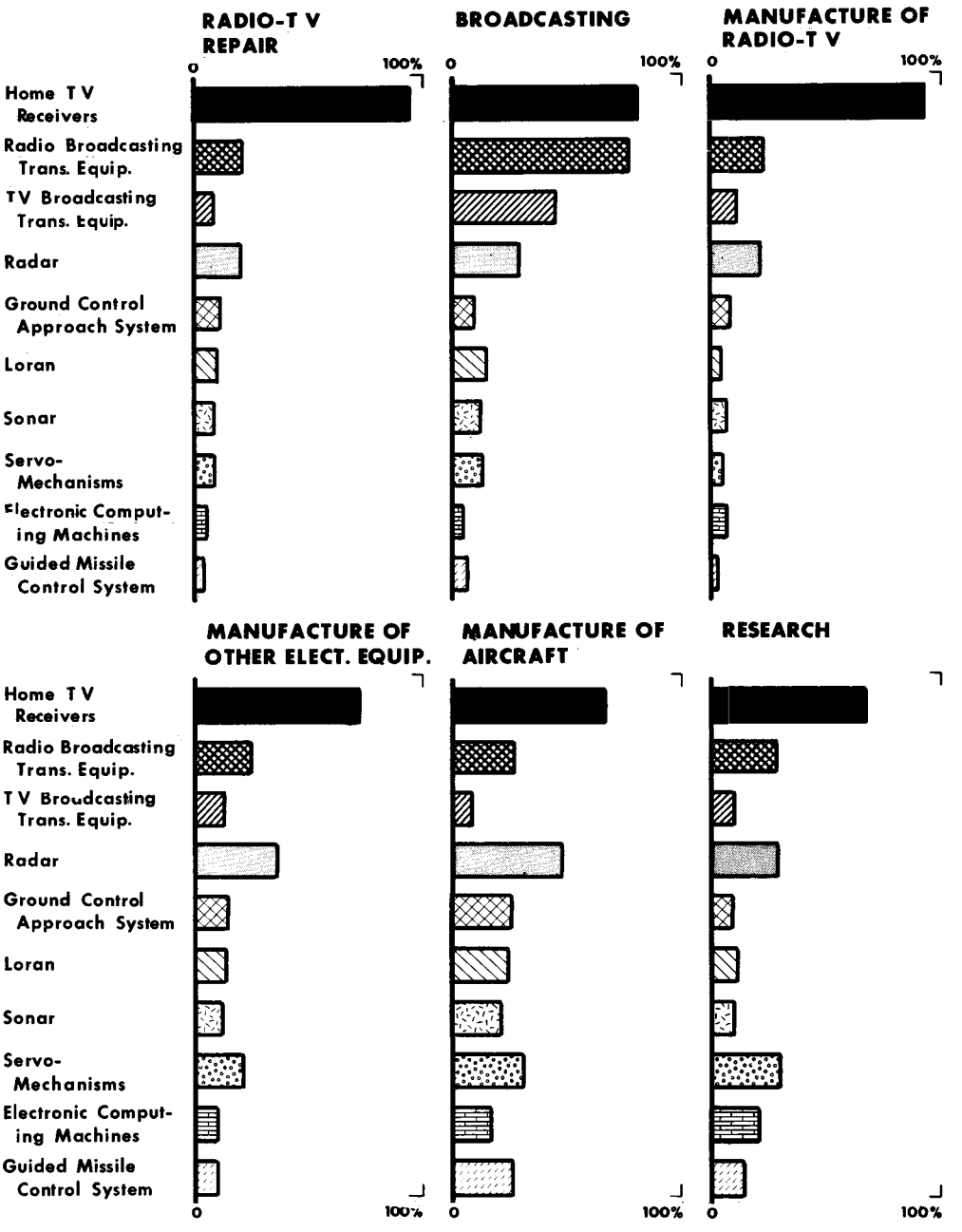
Overtime was quite common in other electronics manufacturing and aircraft manufacturing. Thirty-eight percent of the electronic technicians in other electronics manufacturing worked 40 hours, but 32 percent worked 41 to 48 hours, and 29 percent worked more than 48 hours, and 29 percent worked more than 48 hours per week. Comparable proportions for those in aircraft manufacturing show that 30 percent worked 40 hours, 54 percent worked 41 to 48 hours, and 16 percent worked more than 48 hours.

Most respondents had been in the jobs they held at the time of the survey for short periods of time (table 5). Twenty-six percent of all the electronic technicians had been in their jobs only 12 months or less, and 54 percent had been in their jobs only 36 months or less. In contrast only 14 percent had spent as many as 8 years in their jobs.

Tenure of electronic technicians in their jobs varied considerably by type of establishment. Technicians in broadcasting had the longest tenure, with 27 percent in their job longer than 8 years, but even here a large proportion--32 percent--had been in their jobs only 24 months or less. In aircraft manufacturing, which underwent a rapid expansion after the Korean outbreak in 1950, job tenure was shortest, with 74 percent of the technicians in their jobs only 18 months or less. Technicians in research and other

Chart 16. ELECTRONIC TECHNICIANS COULD REPAIR A VARIETY OF TYPES OF EQUIPMENT

Percentage of Electronic Technicians in Each Type of Establishment Who Reported That They Could Make Major Repairs on Specified Types of Equipment, 1952



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electronics manufacturing also had very short tenures, with 57 percent of those in research and 46 percent of those in other electronics manufacturing in their jobs only 18 months or less. However, although most of those in other electronics manufacturing had short tenures, this group as a whole ranked second in proportion (15 percent) of technicians with more than 8 years in their jobs.

Second to the broadcasting group in average length of job tenure, the radio and television repair group had only 31 percent in the 18 months or less category and 12 percent in the over 8 years category. Thirty-two percent of the electronic technicians in radio and television manufacturing had less than 18 months tenure in their jobs.

Equipment Skills

To provide information on the range and degree of the skills of electronic technicians, each respondent was asked to check those items on which he could make a minor or a major repair from a list of 17 of the better known kinds of electronic equipment. The equipment items on which the respondent said he could make major repairs offered the most reliable indicators of skill and were therefore used as the basis for this analysis.

Several considerations limit the implications of these findings. The data represent the respondent's statement of his abilities and are not the result of objective tests. Since the 17 types of equipment listed vary widely in size and complexity, an ability to repair one type of equipment cannot necessarily be equated with the ability to repair a different type of equipment. For instance, a man who could repair home radios, television sets, and military radio equipment would seem to rank, in terms of versatility, as high as a man who could repair radar, guided missile control systems, and electronic computing machines, though it is obvious that the second man had skills of higher order. Thus, while the data often reflect differences in degree of skill, they are conclusive with respect to versatility in terms of equipment skills.

The data obtained to evaluate equipment skills can be considered in several ways: To what extent do electronic technicians in the six different types of establishments possess the same equipment skills? How versatile are they in terms of repairing various kinds of equipment? What, if any differences in overall skill level are apparent among the six groups?

Electronic technicians in all six of the types of establishment covered in the survey possessed enough skills in common to permit the conclusion that they constituted a true occupational class (chart 16). The findings illustrate this point very dramatically. For instance, radar, which had no place in the jobs

Table 5.--Respondents' Tenure in Job, by Type of Establishment, April-May 1952

Tenure in job held at time of survey	All establishments		Type of establishment											
			Radio-tv repair		Broadcasting		Manufacture of radio-tv		Manufacture of other electronic equipment		Manufacture of aircraft		Research	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	1,926	100.0	1,017	100.0	354	100.0	79	100.0	197	100.0	132	100.0	147	100.0
1 - 6 months	285	14.8	137	13.5	27	7.6	15	19.0	39	19.8	40	30.2	27	18.4
7 - 12 months	220	11.4	106	10.4	32	9.0	7	8.9	23	11.7	27	20.5	25	17.0
13 - 18 months	181	9.4	73	7.2	25	7.1	3	3.8	29	14.7	19	14.4	32	21.8
19 - 24 months	146	7.6	74	7.3	28	7.9	11	13.9	20	10.2	4	3.0	9	6.1
25 - 36 months	217	11.3	150	14.8	26	7.4	7	8.8	11	5.6	12	9.1	11	7.5
37 - 60 months	327	17.0	173	17.0	83	23.4	18	22.7	24	12.2	15	11.3	14	9.5
61 - 96 months	278	14.4	181	17.7	36	10.2	12	15.3	21	10.6	7	5.4	21	14.3
Over 96 months	272	14.1	123	12.1	97	27.4	6	7.6	30	15.2	8	6.1	8	5.4

Table 6.--Number of Specified Types of Equipment on Which Respondents Could Make Major Repairs by Type of Establishment, April-May 1952

Number of types of equipment	All establishments		Type of establishment											
			Radio-tv repair		Broadcasting		Manufacture of radio-tv		Manufacture of other electronic equipment		Manufacture of aircraft		Research	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total, all types	1,926	100.0	1,017	100.0	354	100.0	79	100.0	197	100.0	132	100.0	147	100.0
One	73	3.8	27	2.7	11	3.1	4	5.1	11	5.6	6	4.5	14	9.5
Two	475	24.7	341	33.5	35	9.9	24	30.3	40	20.3	16	12.1	19	12.9
Three	315	16.4	203	19.9	41	11.6	12	15.2	22	11.2	15	11.4	22	14.9
Four	271	14.1	138	13.5	58	16.4	15	19.0	27	13.7	16	12.1	17	11.6
Five	204	10.6	96	9.4	49	13.9	8	10.1	17	8.6	17	12.9	17	11.6
Six	186	9.7	71	7.0	51	14.4	9	11.4	22	11.2	15	11.4	18	12.2
Seven	118	6.1	40	3.9	38	10.7	3	3.8	10	5.1	14	10.6	13	8.8
Eight or more	232	11.9	97	9.7	59	16.6	4	5.1	30	15.2	25	19.0	17	11.0
Not reported	52	2.7	4	.4	12	3.4	--	--	18	9.1	8	6.0	10	6.8

being done by the electronic technicians in radio and television repair, broadcasting, and radio and television manufacturing, was mentioned by at least one-fifth of the technicians in each of these groups as a type of equipment on which they could make major repairs. Conversely, over two-thirds of the technicians in other electronics manufacturing, aircraft manufacturing, and research could make major repairs on home television receivers, a type of equipment which had no direct relationship to their jobs. The fact that there were some men in each of the six groups who could make major repairs on every one of the types of equipment listed also evidenced a homogeneity of skill.

Electronic technicians were versatile in terms of the number of different types of electronic equipment on which they could make major repairs (table 6). Almost all electronic technicians could make major repairs on 2 or more types of equipment, over half (53 percent) of them could repair 4 or more, and 28 percent of them could repair 6 or more.

The proportion of technicians who could make major repairs on six or more types of equipment is a fairly accurate index of versatility because it separates those who were conversant with only radio and television equipment from those with a wider range of skills. Versatility, measured in this way, varied somewhat by type of establishment. The proportion of men who could repair 6 or more types of equipment was highest among electronic technicians in broadcasting (42 percent), and lowest among those in radio and television manufacturing (20 percent), and radio and television repair (21 percent). Midway between these extremes were the other 3 groups, with the proportion being 31 percent in aircraft manufacturing and 32 percent in other electronics manufacturing and in research. Thus, it appears that electronic technicians in broadcasting were most versatile, those in repair and manufacture of radio and television were least versatile, and those in aircraft manufacturing, other electronics manufacturing, and research were intermediate in versatility.

On the basis of these findings, what can be said about the relative overall skill level among the six groups in the survey? The above data on versatility are sufficiently variant to justify the view that, considered as groups, the electronic technicians in broadcasting were most skilled, those in radio and television manufacture and repair were least skilled and the other three groups--other electronics manufacturing, aircraft manufacturing, and research--were about equal in skill, ranking between the others.

APPENDIXES

A - METHODOLOGY

The objectives of this study required the collection of a great deal of detailed information about the worker's personal background and his work history during the 12-year period from January 1940 to April-May 1952. A personal interview survey was chosen as the best method for obtaining this information.

Questionnaires

Two questionnaires were used in the survey; an establishment form for information obtained from employers, and an employee questionnaire for information obtained by interviewing the individual technicians. Both forms were pretested in Philadelphia and Baltimore before the final form was determined.

The establishment schedule 10/ was designed to supply those facts that an employer would be better qualified to provide, such as hiring methods, training conducted in the plant, job breakdowns, plant employment, number of technicians employed, and job descriptions for electronic technicians. The establishment interview also enabled the field supervisor to arrange for personal interviews of a representative sample of the electronic technicians employed in the plant.

The individual technician questionnaire 11/ provided detailed information on the worker, his job, his skills, his training, and his work history. Tabulations from this form provided the statistics on which the main conclusions of this report are based. Almost all questions were pre-coded in order to help the field staff better understand what information was sought by each question, to hold writing during interviews to a minimum, and to facilitate preparation for machine tabulation.

10/ See appendix B.
11/ See appendix B.

Sample Design

The primary consideration in the selection of a sample for the survey was the relationship between available funds and the maximum reliable information about electronic technicians that could be obtained. Sampling all electronic technicians on a nation-wide basis was not feasible. On the other hand, concentrating on only one or two of the industries in which technicians are employed would have made it impossible to apply the findings to all electronic technicians, since no one subgroup can be considered typical. It was therefore decided to select a sample of 1,800 technicians from among 6 types of establishments that employ over 90 percent of all civilian electronic technicians in the United States. The survey was further restricted to eight of the largest metropolitan areas, which include the heaviest concentrations of electronic technicians and represent every geographical section of the Nation. Thus the universe from which our sample of electronic technicians was drawn includes all establishments located in these cities which are engaged in: (1) repair of home radio and/or television receivers; (2) radio and/or television broadcasting; (3) manufacture of radio and/or television receivers; (4) manufacture of other electronic equipment; (5) manufacture of aircraft; and (6) research and development. Table 7 illustrates the theoretical basis of the sample.

Table 7.--Theoretical Basis for Allocation of Employee Schedules

Type of establishment	Estimated number of electronic technicians employed in United States in April-May 1950	Estimated number of electronic technicians in 8 cities visited in April-May 1950	Is this group relatively homogeneous as to job duties, etc.?	Is proportionate representation by city feasible?	Distribution of employee schedules		Percent of sample to universe of 8 cities	
					Planned	Actual	Planned	Actual
Total, all establishments-----	100,000	34,000	--	--	1,800	1,926	5.9	6.4
Repair of radio and/or television ----------	70,000	20,000	Yes	Yes	900	1,017	4.5	5.1
Broadcasting ----------	13,000	3,500	No	Yes	350	354	10.0	10.1
Manufacturing:								
Radio and/or television --------	1,500	1,000	Yes	No	100	79	10.0	7.9
Other electronic equipment -----	3,500	2,500	No	No	150	197	6.0	7.9
Aircraft ----------	3,500	2,500	No	No	150	132	6.0	5.3
Research ----------	1,500	1,000	No	No	150	147	15.0	14.7
Other (not covered in survey) ----	7,000	3,500	--	--	--	--	--	--

Research establishments to be visited were chosen randomly from lists obtained from the 1950 edition of Industrial Research Laboratories of the United States and other more recent data in the files of the Bureau of Labor Statistics. Lists of broadcasting stations obtained from the Federal Communications Commission were stratified by number of technical employees and by city and then sampled randomly within these groups. Manufacturing establishment lists compiled from Bureau of Labor Statistics, National Production Authority, and other government sources were stratified by size of employment and then sampled randomly within groups. Repair establishments were chosen randomly from a list obtained by combining the radio repair and the television repair phone book listings for each metropolitan area and eliminating duplicate listings.

The Standard Industrial Classification 12/ was adhered to wherever possible. However, its application in this study was limited by the indefinite relationship between certain SIC industry groups and employment of electronic technicians. For instance, many plants making electronic equipment employ no electronic technicians, while many department stores employ electronic technicians in their radio-television service departments. The relationships between SIC industries and the six types of establishments covered in the survey are shown by the following outline:

Survey Designation	SIC Coverage	SIC Designation
Establishments engaged in:		
Radio-Tv repair	7621	Electrical repair shops
	Part of 5723	Radio stores
	Part of 5311	Department stores
Broadcasting	7712	Radio broadcasting
	7713	Television broadcasting
Radio-Tv manufacturing	Part of 3661	Radios, radio and television equipment, radar and related detection apparatus, phonographs.
Other electronics manufacturing	Part of 3661	(See above)
	Part of 3662	Radio tubes
	Part of 3669	Communication equipment, n.e.c.
Aircraft manufacturing	3721	Aircraft
Research and development	Part of 7399	Business services, n.e.c.

12/ Standard Industrial Classification Manual, Bureau of the Budget, Volume I, Manufacturing Industries, 1945; Volume II, Non-manufacturing Industries, 1949.

Table 8 shows the distribution of the technicians who participated in the survey by metropolitan area and type of establishment.

Table 8.--Distribution of Electronic Technicians Surveyed, by Metropolitan Area and Type of Establishment, April-May 1952

Metropolitan area	All types of establishments	Type of establishment					
		Radio-tv repair	Broad casting	Manufacture of radio-tv	Manufacture of other electronic equipment	Manufacture of aircraft	Research
Total	1,926	1,017	354	79	197	132	147
Atlanta	119	90	19	--	--	10	--
Baltimore	187	103	27	--	28	7	22
Boston	210	117	35	--	38	--	20
Chicago	243	139	46	35	17	--	63
Detroit	162	112	41	--	--	2	7
Los Angeles	288	136	52	8	8	74	10
New York	490	190	100	36	62	33	69
Philadelphia	227	130	34	--	44	6	13

Collection

Individual technicians to be interviewed were selected from these establishments by obtaining a complete list of electronic technicians employed at each establishment and selecting randomly a proportion of the total that would give the plant the proper representation. A minimum of 1 year of school or on-the-job training in electronics was used as a criterion for selecting respondents. When other factors, such as equipment skills and wages, indicated that, despite job titles, the worker did not perform the duties of an electronic technician, he was not selected.

All employee schedules were edited in the field by the field supervisor. In cases where interviewers turned in schedules which had inconsistent entries or unanswered questions, follow-up telephone calls were made to obtain the correct information. These precautions resulted in a very high percentage of usable schedules being obtained; of 1,963 schedules collected, 1,937 were complete in all respects. Since the 11 women were too small a group for analysis, 1,926 schedules from male technicians supplied the basis for this report.

Coding and Tabulation

When the establishment schedules were received, they were arranged by size of total employment, and the coded information on them was transcribed to a master sheet, from which hand tabulations were made.

The information on the employee questionnaires was punched on IBM cards. A Primary Card 13/ containing all information except the work history was punched first. Then for every status (job, service in Armed Forces, unemployment, or schooling after high school) appearing in the work history, an Excess Card 13/ was punched.

Analyzing the movements of electronic technicians over a 12-year period during which many of them were in statuses other than electronic technician jobs presented a rather complex problem. On the one hand, to consider together all movements made by respondents would result in adding together such things as jobs, unemployment periods, Armed Forces service, and schooling. On the other hand, studying each type of status separately would lose the continuity of the respondents' work histories. The solution arrived at was to show all movements in terms of type of status entered and left and time of occurrence. This system allowed all changes made by respondents to be shown while still allowing the analysis of any particular type of status.

Special tabulation techniques were developed to effect this end. The object of the tabulation scheme was to transfer the work history information from the schedules to IBM cards in such a manner that:

1. The entire coded work history of each respondent could be reproduced by machine.

2. All statuses in the work histories could be analyzed by machine from any of the following standpoints:

    a. Type
    b. Sequence of types
    c. Time
    d. Duration
    e. Location
    f. Characteristics of respondent at time of entry into the status

---

13/ See appendix B.

The unit on which the excess cards were based was the "labor force status." (See definition on page 44). For every such status, an Excess Card was punched containing the following information:

1. Schedule identification -- identifying the particular respondent.

2. Background characteristics as of time of survey, 1952.

3. Status number - numbered consecutively backward from respondent's present status to last entry on work history. This number and the schedule identification (1. above) enable the machine grouping of individual work histories in order of successive statuses.

4. Type of status and type of next previous status - allows sequence analysis

5. Other facts about the status:

    a. Location
    b. Year began
    c. Year ended
    d. Type of plant
    e. Main job duties
    f. Method of getting job
    g. Reason for leaving job

6. Personal characteristics at time status began -- age, marital status, fatherhood, years in field of electronics

These cards permitted the placing of every status change in time and provided for the analysis of movements on a yearly basis. They made it possible to separate all electronic technician jobs held by respondents over the 12 years and to study them in detail. They showed just how and when the needs of our Armed Forces in World War II affected these men.

Statistical Reliability

The sample of 1,926 electronic technicians was one of the largest groups of workers in a single occupation that had ever been studied. It thus offered many opportunities for detailed analysis without sacrifice of statistical reliability. Nevertheless, in some instances, cross tabulations resulted in very small groupings. To prevent erroneous conclusions, basing of conclusions on groups containing too few cases (in general, less than 50) was avoided even though the figures may have appeared significant. The Chi-square test was used to guard against the imputation of significance to variations which could be due to chance.

B.L.S. No. 2275A

Individual Technician Schedule

Budget Bureau No. 44-5202.1
Approval expires September 30, 1952

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON 25, D. C.

Confidential *Confidential*

OCCUPATIONAL MOBILITY OF ELECTRONIC TECHNICIANS

1. Name of Interviewer: _____

2. Date of Interview: _____, 1952

3. City	☐	1
4. Establishment	☐☐	2, 3
5. Technician	☐☐	4, 5
6. Type of establishment	☐	6

A. Sex: A ☐ 7

_____ 0. Male
_____ 1. Female

B. IN WHAT YEAR WERE YOU BORN? _____ B ☐☐ 8, 9

C. ARE YOU MARRIED? Check one: C ☐ 10

_____ 0. Single
_____ 1. Married; IN WHAT YEAR WERE YOU MARRIED? In 19☐☐ 69,70
_____ 2. Other: (Divorced, widowed, separated.)

D. DO YOU HAVE ANY CHILDREN? Check one: D ☐ 11

_____ 0. No
___ 1. Yes: WOULD YOU TELL ME THE YEARS IN WHICH THEY WERE BORN STARTING WITH THE OLDEST CHILD?
_____, _____, _____, _____, _____.

E. HOW MANY DEPENDENTS DO YOU HAVE, INCLUDING YOURSELF? E ☐ 12
Check one:

_____ 1. One _____ 4. Four
_____ 2. Two _____ 5. Five
_____ 3. Three _____ 6. Six
_____ 7. Seven or more

F. DO YOU RENT YOUR APARTMENT (OR HOUSE)? Check one: F ☐ 13

_____ 0. Own house; IN WHAT YEAR DID YOU BUY YOUR (FIRST) HOME? In 19☐☐ 71,72
_____ 1. Rent house
_____ 2. Rent apartment
_____ 3. Rent room
_____ 4. Living with parents in their home
_____ 5. Other (specify _____)

G. WHAT WAS THE HIGHEST GRADE OF REGULAR SCHOOL YOU COMPLETED? G ☐ 14
Check one:

_____ 0. Below 8th grade _____ 3. Some college*
_____ 1. 8th to 11th grade _____ 4. Graduated college*
_____ 2. Graduated high school _____ 5. Graduate work*

*If 3, 4, or 5 was checked, ask:
WHAT WAS YOUR MAJOR FIELD IN COLLEGE? Check one: G* ☐ 15

_____ 0. Electrical or electronic engineering
_____ 1. Other (specify _____)

H. WHICH SUBJECT DID YOU LIKE BEST IN HIGH SCHOOL? H [ ] 16

_____.

I. ARE YOU A VETERAN OF WORLD WAR II? Check one: I [ ] 17

_____ 0. No
_____ 1. Yes

J. DO YOU BELONG TO A MILITARY RESERVE? Check one: J [ ] 18

_____ 0. No.
_____ 1. Yes

K. IN WHAT YEAR DID YOU START YOUR FIRST FULL-TIME JOB, CIVILIAN OR MILITARY, AS A TECHNICIAN IN THE GENERAL FIELD OF ELECTRONICS (RADIO, ETC.)? K [ ] 73,74

In 19___.

L. a. WHAT WERE YOU DOING BEFORE YOU WENT INTO ELECTRONICS WORK? La [ ] 66
Check one:

_____ 0. Was full-time student in electronics course at a technical school.
_____ 1. Was a student in high school
_____ 2. Was a student in college
_____ 3. Was in the Armed Forces in a non-electronics job.
_____ 4. Worked in another job*
_____ 5. Other (specify _____)

b. If respondent was working previously (if 4 above was checked) ask: WHICH OF YOUR PREVIOUS JOBS WOULD YOU SAY WAS YOUR USUAL OCCUPATION? _____ Lb [ ] 67

c. WHAT DID YOU DO IN YOUR USUAL OCCUPATION? (Briefly): _____

_____

_____

M. HOW DID YOU HAPPEN TO BECOME INTERESTED IN ELECTRONICS? M [ ] 68

_____

_____

_____

_____

N. HOW MANY MONTHS OF YOUR TRAINING IN ELECTRONICS CONSISTED OF: N

a. FULL-TIME COURSE IN CIVILIAN SCHOOL? a [ ] 19,20
(WHAT SCHOOL? _____) _____ Mos.

b. ARMED FORCES ELECTRONICS SCHOOL? b [ ] 21,22
(WHAT SCHOOL? _____) _____ Mos.

c. PART-TIME CLASSES IN CIVILIAN SCHOOL? _____ Mos. c [ ] 23,24

d. APPRENTICESHIP? (WHAT TRADE? _____) _____ Mos. d [ ] 25,26

e. OTHER ON-THE-JOB TRAINING? _____ Mos. e [ ] 27,28

f. OTHER, SUCH AS CORRESPONDENCE COURSES, AMATEUR "HAM" or HOBBY WORK, HOME STUDY, ETC. GIVE DETAILS _____ f [ ] 29,30

_____

_____

O. DO YOU HAVE A LICENSE FOR OPERATING OR REPAIRING ELECTRONIC EQUIPMENT ISSUED BY THE FEDERAL, STATE, OR LOCAL GOVERNMENT? Check one: O ☐ 31

_____ 0. No
_____ 1. Yes; WHAT KIND? _____

P. WHICH OF THESE ARRANGEMENTS BEST DESCRIBES YOUR PRESENT JOB? Check one: P ☐ 32

_____ 0. Work independently
_____ 1. Supervise others doing electronics work
_____ 2. Act as helper to a higher grade man
_____ 3. Work in a crew with other technicians at the same grade
_____ 4. Other (specify_____)

Q. ON WHAT BASIS IS YOUR PAY FIGURED AT YOUR PRESENT JOB? Check one: Q ☐ 33

_____ 0. Income from own business
_____ 1. Salary
_____ 2. Hourly rate*
_____ 3. Other (specify_____)

*If 2 is checked, ask:
WHAT IS YOUR STRAIGHT-TIME HOURLY RATE? Check one: Q* ☐ 34

_____ 0. Less than $1.25
_____ 1. $1.25 - $1.49
_____ 2. $1.50 - $1.74
_____ 3. $1.75 - $1.99
_____ 4. $2.00 - $2.24
_____ 5. $2.25 - $2.49
_____ 6. $2.50 - $2.74
_____ 7. $2.75 - $2.99
_____ 8. $3.00 - $3.24
_____ 9. $3.25 or more

R. OVER THE PAST 2 MONTHS, ABOUT HOW MUCH DID YOU EARN PER WEEK (BEFORE DEDUCTIONS)? Check one: R ☐ 35

_____ 0. Less than $50
_____ 1. $50 - 59
_____ 2. $60 - 69
_____ 3. $70 - 79
_____ 4. $80 - 89
_____ 5. $90 - 99
_____ 6. $100 - 119
_____ 7. $120 - 139
_____ 8. $140 - 159
_____ 9. $160 or more

S. OVER THE PAST 2 MONTHS, HOW MANY HOURS DID YOU USUALLY WORK PER WEEK?_____hours. S ☐ 36,37

T. a. HOW LONG DO YOU THINK IT WOULD TAKE TO TRAIN A HIGH SCHOOL GRADUATE TO DO YOUR TYPE OF WORK?_____months. Ta ☐ 43,44

b. IF YOU WERE TRAINING THIS MAN, HOW WOULD YOU DIVIDE THIS TIME BETWEEN TECHNICAL SCHOOL AND ON-THE-JOB TRAINING? Tb ☐ 45,46

_____ months in technical school. ☐ 47.48

_____ months in on-the-job training.

U. WHAT OTHER IDEAS DO YOU HAVE ABOUT THE BEST POSSIBLE WAYS TO TRAIN ELECTRONIC TECHNICIANS? _____

V. ON THE BASIS OF YOUR ACTUAL EXPERIENCE WITH THE EQUIPMENT LISTED BELOW, INDICATE WHICH OF THESE OPERATIONS YOU CAN PERFORM:

Check as many squares as apply:

Equipment	a. Make major repairs on (4)	b. Make minor repairs on (2)	c. Operate (1)	d. Code Total	e. Col. No.
1. Home radio receivers			xxxxxxxxxx		49
2. Home television receivers			xxxxxxxxxx		50
3. Police, taxi, etc. radio equip.			xxxxxxxxxx		51
4. Military radio communication equipment			xxxxxxxxxx		52
5. Radio broadcast transmitting equipment					53
6. TV broadcast transmitting equip.					54
7. Radar					55
8. Ground control approach system					56
9. Sonar					57
10. Loran					58
11. Shoran					59
12. Teleran					60
13. Guided missile control system					61
14. Electronic computing machines					62
15. X-ray equipment (industrial or medical)					63
16. Servomechanisms					64
17. Electronic counting and sorting devices					65

W. Work History. Present job back through 1940

Instructions: Introduce this section by asking WHEN DID YOU START YOUR PRESENT JOB? List present job first and enter length of time in each different job on a separate line even if employment was in the same firm or plant; account for all months, January 1940 to date, including periods of military service, unemployment, or schooling between jobs. Lead into each previous job by asking WHAT DID YOU DO BEFORE THAT?

AA	BB	CC	DD			
WHAT WAS THE NAME OF THE FIRM?	IN WHAT CITY WAS IT LOCATED?	WHAT WAS YOUR EXACT JOB TITLE?	WHEN DID YOU WORK THERE?			
			From		To	
			Mo.	Yr.	Mo.	Yr.
a.		a.				
b.		b.				
c.		c.				
d.		d.				
e.		e.				
f.		f.				
g.		g.				
h.		h.				
i.		i.				
j.		j.				
k.		k.				
l.		l.				
m.		m.				
n.		n.				

REMARKS:

EE	FF	GG	HH
WHAT DID THE PLANT DO? Insert proper code no. here ⬇ / code #	WHAT DID YOU DO (MOST OF THE TIME) IN THE JOB? Insert proper code no. here ⬇ / code #	HOW DID YOU HAPPEN TO GET THE JOB? Insert proper code no. here ⬇ / code #	WHAT WAS YOUR MAIN REASON FOR LEAVING THE JOB? Insert proper code no. here ⬇ / code #
a.	a.	a.	a. xxx
b.	b.	b.	b.
c.	c.	c.	c.
d.	d.	d.	d.
e.	e.	e.	e.
f.	f.	f.	f.
g.	g.	g.	g.
h.	h.	h.	h.
i.	i.	i.	i.
j.	j.	j.	j.
k.	k.	k.	k.
l.	l.	l.	l.
m.	m.	m.	m.
n.	n.	n.	n.
0. Repair home radio or TV sets. 1. Mftr. radio or TV sets. 2. Mftr. other civilian electronic equipment. 3. Broadcasting. 4. Mftr. aircraft. 5. Other (specify below).	0. Repair home radio and TV sets. 1. Repair other electronic equipment. 2. Inspect and test other electronic equipment. 3. Install other electronic equipment. 4. Research laboratory work. 5. Operate transmitting equipment. 6. Other electronic work (specify below). 7. Other	0. Heard of opening through acquaintance working in plant. 1. Referred by technical school. 2. Just went to plant employment office. 3. Worked there before; called back. 4. Saw help-wanted advertisement. 5. Through public employment office. 6. Through private employment agency. 7. Through labor union. 8. Was promoted. 9. Other (specify below).	0. Layoff 1. Was terminated (discharged). 2. Company went out of business. 3. Entered Armed Forces. 4. Family moved. 5. Entered full-time school. 6. Was promoted. 7. Was dissatisfied with job. 8. Took a better job. 9. Other (specify below).

BLS No. 2275B

Establishment Schedule

Budget Bureau No. 44-S202.1
Approval expires September 30, 1952

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
Washington 25, D. C.

OCCUPATIONAL MOBILITY OF ELECTRONIC TECHNICIANS

Confidential — Confidential

ESTABLISHMENT INFORMATION

1. Name of interviewer:_____
2. Date of interview:_____, 1952
3. Type of establishment Code No. [ ] 5. If manufacturer or research laboratory what is principal product or products made or worked on?_____
4. Names and titles of officials interviewed:

Name:_____ Title:_____

5. City..... [ ] 1
6. Establishment..... [ ][ ] 2,3
7. Firm name:_____
8. Plant address_____

A. HOW MANY PEOPLE WERE EMPLOYED AT THIS ESTABLISHMENT AT YOUR LAST REGULAR PAY PERIOD?_____. A [ ][ ][ ][ ] 6 7 8 9

B. a. WHAT JOB TITLES USED IN YOUR PLANT MIGHT BE INCLUDED IN THE GENERAL JOB GROUP OF ELECTRONIC TECHNICIAN? B [ ][ ][ ] 10 11 12

b. WHAT DO THESE WORKERS DO? (Briefly)

c. HOW MANY PEOPLE ARE NOW WORKING IN EACH OF THESE JOBS? (HOW MANY ARE WOMEN?)

a. Job title	b. Job description (If printed descriptions are available, attach to this form.)	c. No. of workers	
		Both sexes	Women

C. OVER THE PAST FEW YEARS, HAVE YOU FILLED ANY OF THESE TECHNICIANS' JOBS BY TRAINING MEN IN YOUR PLANT? Check one: C [ ] 13

____0. No
____1. Yes*

*If 1 is checked, ask:

DO YOU CONDUCT ANY:

a. FORMAL APPRENTICESHIP PROGRAM? No___0; Yes___1. C* [ ] 14

b. ON-THE-JOB TRAINING PROGRAM OTHER THAN APPRENTICESHIP? No__0; Yes__1. [ ] 15

c. SUPPLEMENTARY TRAINING OUTSIDE THE PLANT? No__0; Yes__1. [ ] 16

(Over)

D. TO MEET SHORTAGES OF SKILLED TECHNICIANS, DO YOU USUALLY:

D [ ] 17
[ ] 18

a. UPGRADE WORKERS IN RELATED JOBS? No__0; Yes__1. If Yes, ask FROM WHICH JOBS DO YOU UPGRADE?_____.

b. BREAK DOWN THE JOB? No__0; Yes__1.

E. WHEN YOU NEED TO HIRE TRAINED MEN FOR ELECTRONIC TECHNICIANS' JOBS, WHICH OF THESE METHODS DO YOU USE? (Place numbers 1 and 2 by the two methods most often used by this employer.)

E [ ] 19
[ ] 20

___0. Hire through State Employment Service
___1. Take unsolicited applications at the plant
___2. Advertise in Help-Wanted columns
___3. Hire through a labor union
___4. Hire through a technical school
___5. Hire through private employment agency
___6. Hire people on recommendations of employees
___7. Other (specify_____)

F. DO YOU HAVE ANY FORMAL MINIMUM QUALIFICATIONS THAT YOU REQUIRE OF ALL APPLICANTS FOR LOWEST LEVEL ELECTRONIC TECHNICIANS' JOBS? (WHAT ARE THEY?)

F [ ][ ][ ]
21 22 23

Age_____ 1
Sex_____ 2
Formal education_____ 4
Technical schooling_____ 8
Work experience_____ 16
Formal test_____ 32
Licenses_____ 64
Other (specify_____) 128

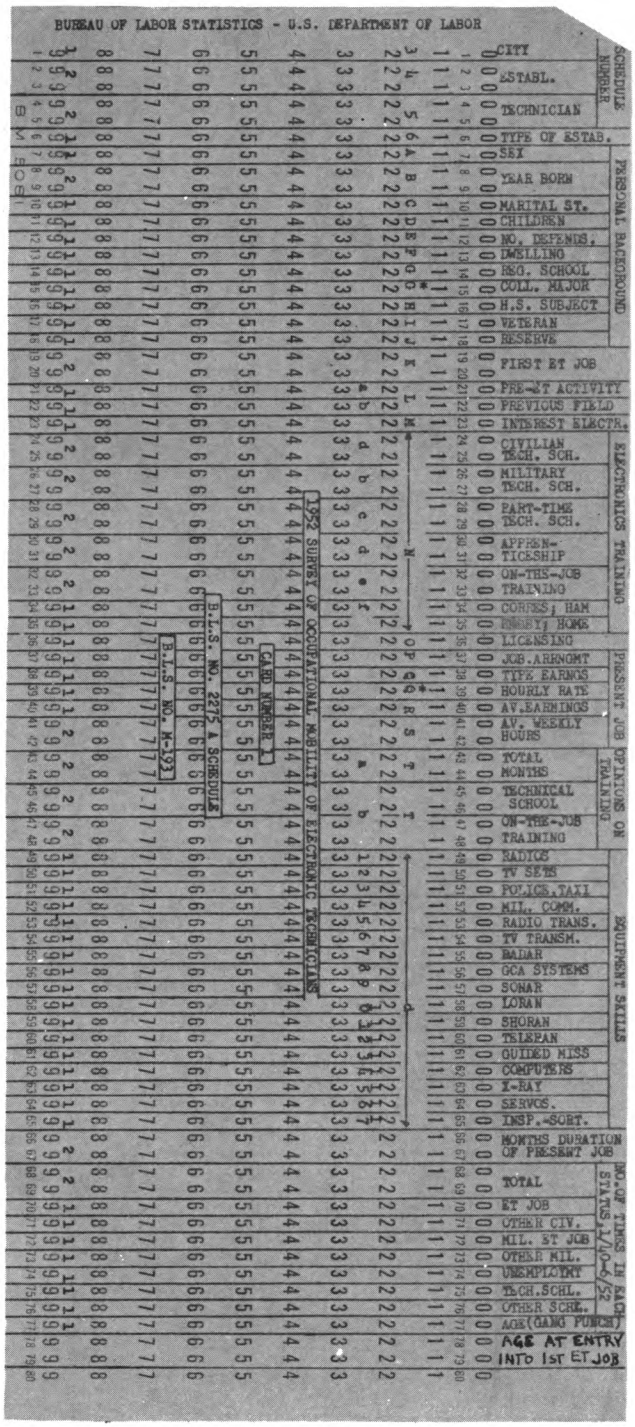
G. DO YOU EXPECT TO HAVE ANY DIFFICULTY IN MEETING YOUR NEEDS FOR ELECTRONIC TECHNICIANS IN THE NEXT YEAR OR TWO? DISCUSS..(Summarize comments of respondent which bear on anticipated needs for workers and appraisals of the availability of trained men from local labor market.)

G [ ] 24

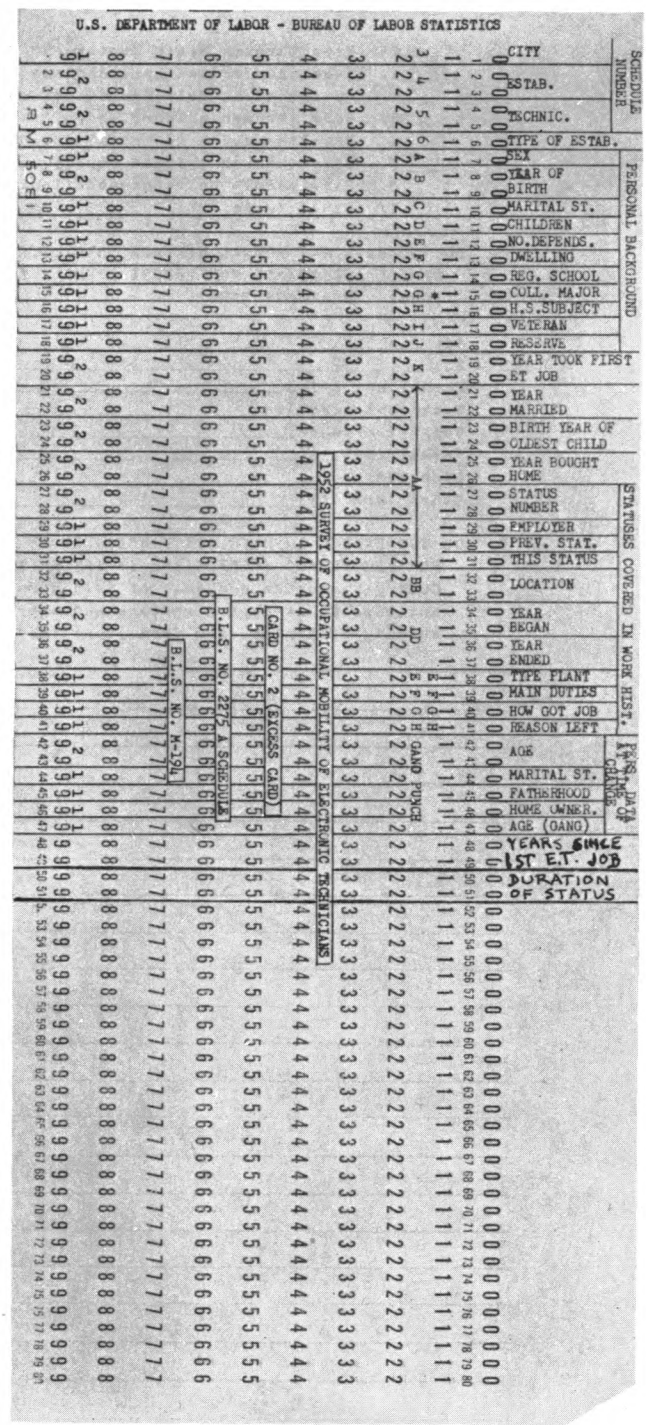
H. Remarks:_____

IBM Card Layout Forms

Primary Card



Excess Card



Number of labor-force status changes respondents made each year by type of status moved out of and into, 1940-52

Type of labor-force status change	Total all years	Year												
		1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952 1/
Total changes	7,261	136	404	596	445	259	655	1080	676	770	689	686	656	209
Into electronic technician jobs, from:	4,049	55	153	187	137	102	291	410	367	487	495	544	613	208
Electronic technician jobs	2,253	33	89	114	71	57	114	132	168	260	291	337	431	156
Other civilian jobs	597	16	42	56	29	21	28	33	60	65	76	74	77	20
Armed Forces--electronic technician	303	--	2	2	12	7	104	123	12	6	3	5	12	15
Armed Forces--other jobs	114	--	--	--	12	7	28	47	6	6	2	2	2	2
Unemployment	165	--	1	2	3	4	11	41	29	17	19	18	16	4
Technical school--electronics	576	6	16	12	8	5	6	32	85	128	97	104	67	10
College	41	--	3	1	2	1	--	2	7	5	7	4	8	1
Other civilian jobs, from:	1,200	52	112	100	47	42	154	278	144	107	73	70	20	1
Electronic technician jobs	122	4	8	10	9	3	9	11	20	16	12	17	3	--
Other civilian jobs	561	41	86	77	33	24	32	61	70	56	40	25	15	1
Armed Forces--electronic technician	115	--	--	--	1	2	46	49	9	2	2	4	--	--
Armed Forces--other jobs	205	1	2	1	1	8	63	96	14	11	4	4	--	--
Unemployment	109	1	6	5	1	5	4	50	15	10	5	6	1	--
Technical school--electronics	60	2	8	2	1	--	--	8	10	8	9	11	1	--
College	28	3	2	5	1	--	--	3	6	4	1	3	--	--
Into Armed Forces--electronic technician, from:	472	10	73	176	109	48	21	9	3	6	--	13	4	--
Electronic technician jobs	192	3	33	63	45	21	9	2	--	1	--	11	4	--
Other civilian jobs	232	5	40	98	46	22	10	4	2	5	--	--	--	--
Armed Forces--electronic technician	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Armed Forces--other jobs	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Unemployment	7	1	--	1	3	1	1	--	--	--	--	--	--	--
Technical school--electronics	33	1	--	11	13	4	--	3	--	--	--	1	--	--
College	8	--	--	3	2	--	1	--	1	--	--	1	--	--
Into Armed Forces--other jobs, from:	393	10	46	105	129	52	22	17	4	2	2	4	--	--
Electronic technician jobs	72	--	5	18	25	8	7	2	2	--	2	3	--	--
Other civilian jobs	294	10	35	84	94	42	14	12	1	1	--	1	--	--
Armed Forces--electronic technician	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Armed Forces--other jobs	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Unemployment	9	--	3	2	2	2	--	--	--	--	--	--	--	--
Technical school--electronics	12	--	1	1	6	--	1	2	1	--	--	--	--	--
College	6	--	2	--	2	--	--	1	--	1	--	--	--	--
Into unemployment, from:	398	4	8	16	13	6	84	123	33	48	30	20	13	--
Electronic technician jobs	65	--	1	3	5	2	4	12	5	9	9	6	9	--
Other civilian jobs	67	3	3	11	1	1	1	9	6	14	9	8	1	--
Armed Forces--electronic technician	92	--	--	--	1	1	36	40	2	7	3	--	2	--
Armed Forces--other jobs	123	1	1	--	4	1	43	59	8	5	1	--	--	--
Unemployment	1	--	--	--	--	--	--	--	--	1	--	--	--	--
Technical school--electronics	39	--	--	1	2	1	--	3	10	10	5	6	1	--
College	11	--	3	1	--	--	--	--	2	2	3	--	--	--
Into technical school, from:	668	2	9	9	10	8	78	203	115	109	84	35	6	--
Electronic technician jobs	79	--	3	3	3	2	6	13	21	11	8	9	--	--
Other civilian jobs	220	1	3	6	4	1	9	33	39	53	49	18	4	--
Armed Forces--electronic technician	103	--	--	--	2	--	31	52	10	4	4	--	--	--
Armed Forces--other jobs	106	--	1	--	--	5	28	55	8	7	--	2	--	--
Unemployment	106	1	1	--	1	--	4	42	21	20	13	3	--	--
Technical school--electronics	41	--	--	--	--	--	--	6	11	10	9	3	2	--
College	13	--	1	--	--	--	--	2	5	4	1	--	--	--
Into college, from:	81	3	3	3	--	1	5	40	10	11	5	--	--	--
Electronic technician jobs	6	--	--	1	--	--	--	--	2	3	--	--	--	--
Other civilian jobs	14	1	2	1	--	--	1	5	2	1	1	--	--	--
Armed Forces--electronic technician	22	--	--	--	--	1	2	14	2	2	1	--	--	--
Armed Forces--other jobs	15	--	--	--	--	--	2	11	1	1	--	--	--	--
Unemployment	14	1	1	--	--	--	--	8	2	2	--	--	--	--
Technical school--electronics	4	--	--	1	--	--	--	1	1	--	1	--	--	--
College	6	1	--	--	--	--	--	1	--	2	2	--	--	--

1/ From January to April-May only.

Occupational Outlook Publications of the Bureau of Labor Statistics*

Studies of employment trends and opportunities in the various occupations and professions are made available by the Occupational Outlook Service of the Bureau of Labor Statistics.

These reports are for use in the vocational guidance of veterans, in counseling young people in schools, and in guiding others considering the choice of an occupation. Schools concerned with vocational training and employers and trade unions interested in on-the-job training have also found the reports helpful in planning programs in line with prospective employment opportunities.

Occupational Outlook Handbook

Employment Information on Major Occupations for Use in Guidance. Bulletin No. 998 (1951 Revised Edition). Illus. $3.

Includes brief reports on more than 400 occupations of interest in vocational guidance, including professions; skilled trades; clerical, sales, and service occupations; and the major types of farming. Each report describes the employment trends and outlook, the training qualifications required, earnings, and working conditions. Introductory sections summarize the major trends in population and employment and in the broad industrial and occupational groups, as background for an understanding of the individual occupations.

The Handbook is designed for use in counseling, in classes or units on occupations, in the training of counselors, and as a general reference. Its 575 pages are illustrated with 103 photographs and 85 charts.

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	Elementary and Secondary School Principalships--Chief Advancement Opportunity for Public School Teachers. (1951). - - - - - - - - - -	Free
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