

UNITED STATES DEPARTMENT OF LABOR

L. B. Schwellenbach, *Secretary*

BUREAU OF LABOR STATISTICS

Isador Lubin, *Commissioner (on leave)*

A. F. Hinrichs, *Acting Commissioner*

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Employment Outlook For Automobile Mechanics



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Letter of Transmittal

UNITED STATES DEPARTMENT OF LABOR,
BUREAU OF LABOR STATISTICS,
Washington, D. C., August 17, 1945.

The SECRETARY OF LABOR:

I have the honor to transmit herewith a report on employment opportunities for automobile mechanics. This is one of a series of occupational studies prepared in the Bureau's Occupational Outlook Division for use in vocational counseling of veterans, young people in schools, and others considering the choice of an occupation. The present study was prepared by Herbert L. Gottlieb, under the supervision of Helen Wood. Sylvia K. Lawrence assisted in the statistical work. Information on wartime earnings was made available by the Bureau's Wage Analysis Division. The Bureau wishes to acknowledge the generous assistance received in connection with this study from the War Department, U. S. Office of Education, and officials of a number of trade-unions, companies, and trade associations.

A. F. HINRICHS,
Acting Commissioner.

Hon. L. B. SCHWELLENBACH,
Secretary of Labor.



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(III)

Employment Outlook for Automobile Mechanics

Summary

A sharp rise in employment of automobile mechanics is in prospect now that the war is over. Nevertheless, taking the country as a whole, the number of persons who will be seeking work in the occupation will exceed the number of available jobs. Many less skilled men will, therefore, have difficulty in finding work, particularly after the next few months, although the relatively small group of highly skilled specialists and all-around mechanics will have a good chance of employment. These are the chief conclusions of the present study, which was undertaken by the Bureau of Labor Statistics to provide information needed for vocational-guidance purposes. Other subjects of interest to prospective automobile mechanics, also discussed, include training, working conditions, and earnings.

In 1940, there were 377,000 employed automobile mechanics and repairmen and 65,000 who were unemployed, making this one of the largest skilled occupations in the country. During the war, many thousands of persons without previous experience entered the trade, but so many mechanics left to go into war industries and the armed forces that employment dropped by at least 40 percent (or to about 225,000) in 1945.

In view of the expected expansion in motor-vehicle registrations and repair needs, employment will probably return rapidly to the prewar level and subsequently will rise at a slower pace, reaching about 450,000 by 1950. There will also be a few thousand job openings each year owing to deaths, retirements, and transfers to other types of work. However, the number of men with military or civilian experience in automotive repair who are likely to be looking for jobs will exceed the anticipated number of employment opportunities, except perhaps during the transition period.

For people who plan to enter this occupation despite the impending oversupply of labor, the best type of preparation depends on the prospective mechanic's age. Young people under 18 should, if possible, complete at least 2 years of high school before looking for work. In the case of persons over high-school age, the quickest way to become a skilled mechanic is to find employment in a repair shop, learn on the job from experienced men, and concurrently supplement this experience with night-school instruction in related technical subjects. Beginners going to work in the trade have usually had to start out in such jobs as helper, greaser, or washer, although it has sometimes been possible to start as an apprentice, and opportunities

for systematic training are likely to be more widespread than before the war.

Earnings and working conditions of automobile mechanics vary widely, even within the same city. In 1938 and 1939, typical earnings of experienced mechanics ranged from \$20 to \$35 for a 40-60-hour workweek, though some highly skilled men made considerably more. Information on straight-time hourly earnings obtained by the Bureau in 1943 and 1944 indicate that there was a rise in wages during the war. In 1943, straight-time average hourly earnings of general automobile mechanics and body repairmen in most of the areas surveyed ranged from 70 cents to \$1.20, which suggests a typical wage range of \$28 to \$48 for a 40-hour workweek. Actual weekly earnings were usually higher than this, however, owing to longer working hours and, often, to premium pay for overtime. In addition, employment and earnings generally were fairly regular throughout the year, in the prewar period as well as during the war.

Nature of the Occupation

The term automobile mechanic, as used in the present study, covers all skilled workers who repair and replace worn or damaged mechanical, electrical, and body parts of passenger cars, busses, and trucks. Included under this broad definition are general automobile mechanics and various types of specialists, such as auto electricians, carburetor and brake experts, and body repairmen. The general automobile mechanic examines equipment to determine the causes of faulty operation; disassembles such separate parts of the vehicle as the motor, differential, transmission, running gear, and electrical system; repairs or replaces defective parts; reassembles the pieces in their respective places, making the necessary adjustments for alinement and proper clearance; and performs any other tasks necessary to return a vehicle to operative condition.

Specialists other than body repairmen are usually mechanics with an all-around knowledge of automotive repair who have concentrated upon one aspect of the work. They should not be confused with the much larger group of semiskilled men who have knowledge of only one relatively simple aspect of repair work. The latter group—many of whom were trained during the war—may more properly be designated as single-skill mechanics. They are not usually qualified to diagnose the source of trouble and often require the close supervision of a specialist or all-round mechanic.

Reconditioning of fenders and bodies is a distinct specialty which does not require knowledge of the principles of the internal combustion engine and of the various related parts of the vehicle. In consequence, body repairmen are seldom recruited from among general automobile mechanics even in general repair shops. Except in rare instances the all-round mechanic is not qualified to undertake the work of the body repairman.

Automotive machinists, whose occupation consists of using such machine tools as drill presses, lathes, and milling machines in piston and valve boring and grinding and other tasks incidental to the major overhaul of motors, are not covered by this study. Until the latter part of the twenties, the duties of the automotive machinist and mechanic were in many cases performed by the same person, which

may account for the confused and loose way the terms have been used. In more recent years, however, the two types of work have been performed in separate establishments by men with altogether different kinds of training and skill. Separation between the two types of work resulted partly from the large-scale production of extra parts, which made possible the replacement rather than repair of seriously worn or damaged parts. In addition, defective motors are now often removed and replaced by other motors which have been rebuilt in a machine shop or factory. Thus, repair shops seldom need men skilled as machinists, although mechanics may use electric hand drills and reamers in such jobs as fitting replacement parts.

Status of Occupation Before and During the War

More than any other country the United States is geared economically and socially to motor-vehicle transport, supporting in the immediate prewar years over twice as many passenger cars, busses, and trucks as the rest of the world combined. In 1940, there were 32 million registered motor vehicles in the country, 1 for every 4 persons.

To repair and maintain this vast fleet, 377,000 automobile mechanics and repairmen were employed, according to the 1940 Census of Population. Automobile mechanics constituted nearly half of the total number of mechanics and repairmen of all types reported as employed. The numbers of skilled mechanics working on other types of transportation equipment were insignificantly small in comparison. There were, for example, only 40,000 employed railroad and car shop mechanics and 27,000 airplane mechanics. The importance of the occupation is further indicated by the fact that for every 3 employees engaged in the manufacture of automobiles and automobile equipment, 2 automobile mechanics were employed.

Since the use of motor vehicles is Nation-wide, automobile mechanics are needed in all sections of the country, including the smallest rural communities. The greatest concentrations are of course in the regions with the highest motor-vehicle registrations (table 1). Five States—New York, California, Pennsylvania, Illinois, and Texas—had more than one-third both of the total number of registered motor vehicles and of all employed automobile mechanics in 1940. New York and California alone accounted for 17.2 percent of the total registrations and 17.4 percent of the automobile mechanics. In contrast, the six New England States, with only 6.3 percent of the country's motor vehicles, employed only 6.8 percent of the automotive repairmen.

Most mechanics work either in independent general repair shops or in the service departments maintained by dealers of the various car and truck manufacturers. The 1939 Census of Business reported 52,000 independent repair garages. The number of dealer shops reported was considerably smaller, about 34,000 and a few of these did not have service departments. However, on the basis of a sample survey made in 1940 by Motor Service Magazine, the average number of mechanics employed in independent garages was estimated at only 2½ per shop, while the average number in dealer establishments in communities under 10,000 population was over twice as great and in larger cities more than three times as great.² In addition,

² Motor Service Magazine (Chicago, Ill.), July 15, 1944.

TABLE 1.—Number and Percentage Distribution of Automobile Mechanics and Registered Motor Vehicles, by Region and State, 1940

Region and State	Employed automobile mechanics and repairmen ¹		Motor vehicle registrations ²	
	Number	Percent	Number	Percent
United States.....	376,985	100.0	32,025,365	100.0
New England.....	25,541	6.8	2,019,944	6.3
Maine.....	2,763	.7	205,896	.6
New Hampshire.....	1,557	.4	135,384	.4
Vermont.....	1,328	.4	93,645	.3
Massachusetts.....	12,644	3.4	903,843	2.8
Rhode Island.....	1,886	.5	187,509	.6
Connecticut.....	5,363	1.4	493,667	1.6
Middle Atlantic.....	75,789	20.1	5,975,829	18.7
New York.....	37,720	10.0	2,743,014	8.6
New Jersey.....	13,215	3.5	1,086,966	3.4
Pennsylvania.....	24,854	6.6	2,145,849	6.7
East North Central.....	77,622	20.6	7,292,225	22.8
Ohio.....	19,908	5.3	1,918,929	6.0
Indiana.....	10,353	2.7	994,006	3.1
Illinois.....	23,293	6.2	1,925,814	6.0
Michigan.....	16,075	4.3	1,552,561	4.9
Wisconsin.....	7,993	2.1	900,915	2.8
West North Central.....	43,121	11.4	3,959,858	12.4
Minnesota.....	8,693	2.3	871,351	2.7
Iowa.....	8,135	2.2	793,969	2.5
Missouri.....	11,524	3.1	921,800	2.9
North Dakota.....	1,876	.4	152,287	.6
South Dakota.....	2,035	.5	195,607	.6
Nebraska.....	4,504	1.2	412,116	1.3
Kansas.....	6,354	1.7	582,668	1.8
South Atlantic.....	43,838	11.6	3,406,136	10.6
Delaware.....	817	.2	71,763	.2
Maryland.....	5,653	1.5	444,532	1.4
District of Columbia.....	1,793	.5	161,914	.5
Virginia.....	6,710	1.8	498,838	1.6
West Virginia.....	3,779	1.0	302,558	.9
North Carolina.....	7,843	2.1	591,946	1.8
South Carolina.....	3,834	1.0	336,772	1.1
Georgia.....	6,919	1.8	502,603	1.6
Florida.....	6,490	1.7	495,210	1.5
East South Central.....	21,300	5.6	1,510,576	4.7
Kentucky.....	6,430	1.7	463,727	1.4
Tennessee.....	6,514	1.7	447,983	1.4
Alabama.....	4,905	1.3	339,853	1.1
Mississippi.....	3,451	.9	259,013	.8
West South Central.....	37,240	9.9	2,891,438	9.0
Arkansas.....	3,836	1.0	257,177	.8
Louisiana.....	5,184	1.4	365,429	1.1
Oklahoma.....	7,060	1.9	574,719	1.8
Texas.....	21,160	5.6	1,694,113	5.3
Mountain.....	13,824	3.7	1,239,627	3.9
Montana.....	2,073	.6	191,032	.6
Idaho.....	1,789	.5	163,340	.5
Wyoming.....	900	.2	85,657	.3
Colorado.....	3,587	1.0	352,110	1.1
New Mexico.....	1,647	.4	125,056	.4
Arizona.....	1,621	.4	138,403	.4
Utah.....	1,759	.5	139,921	.5
Nevada.....	448	.1	44,108	.1
Pacific.....	38,710	10.3	3,729,732	11.6
Washington.....	6,612	1.8	562,495	1.8
Oregon.....	4,356	1.1	393,578	1.2
California.....	27,742	7.4	2,773,659	8.6

¹ Sixteenth Census of U. S. Population, Vol. II, The Labor Force, Parts 2-5.

² Federal Works Agency, Public Roads Administration. Publicly owned vehicles are excluded.

mechanics were employed in shops specializing in such work as battery and ignition, wheel and axle, and brake repair, which numbered about 5,000 in 1939; in the 7,000 shops engaged primarily in radiator and body repair; in many of the 7,000 used-car establishments; and in about 12,000 garages of transportation companies and of department stores, coal companies, breweries, and other firms which maintained their own fleets of motor vehicles. A few mechanics were employees of the Nation's 242,000 gasoline-filling stations.

As suggested by the comparatively small number of specialized shops, automotive-repair specialists were much less numerous than general automobile mechanics, though the former group has increased in importance in recent years. Specialists are employed not only in shops engaged solely or primarily in their particular type of work but also in some large independent repair garages and greater numbers of fleet and dealer establishments which have become departmentalized. Men employed in departmentalized shops may be shifted from one department to another, however, depending upon fluctuations in the volume of business of different types, and their duties are therefore likely to be more varied than those of mechanics in specialized shops. In the small general repair garage, independent or dealer, departmentalization is of course not feasible, and the mechanic is required, as a rule, to perform any type of repair work necessary to restore a vehicle to operative condition.

Developments after 1940—the spectacular expansion in war industries, recruitment into the armed forces, cessation of passenger-car production, and shortage of repair parts and materials—of course greatly altered conditions in the automotive-service industry. The reserve of unemployed automobile mechanics, who numbered 65,000 at the time of the 1940 Census, was absorbed early in the war, probably before the end of 1942, by the automotive-maintenance industry itself, the armed forces, and war industries. Thousands of employed automobile mechanics were lost to the armed forces and war industries. As a result, employment in the occupation dropped by at least 40 percent between 1940 and 1944—or to about 225,000—according to data from a number of different surveys by Government and private agencies.

The personnel loss which the automotive-maintenance industry sustained is not fully indicated by this net decline in employment. Thousands of experienced mechanics were replaced by persons with little or no previous experience in the field, many of them trained in accelerated courses under the sponsorship of the U. S. Office of Education or of local dealer groups throughout the country. Thus a tremendous qualitative as well as quantitative loss in personnel occurred during the war.

Concurrently, there was a drop in the number of repair shops and in the volume of repair work handled, though this was not as great as the decline in employment. Estimates by Motor Service Magazine, for example, show a decrease in employment of mechanics between 1941 and 1944 of almost 30 percent, but a drop of only 22 percent in the number of independent and dealer shops and of only 15 percent in the number of service jobs handled.³

That the decrease in volume of work was not in proportion to the decline in employment during the war points to an increase in

³ Motor Service Magazine (Chicago, Ill.), July 15, 1944, and November 1, 1944.

the average number of jobs handled per mechanic per week. This is explained, in part, by a rise in average hours of work, particularly in small independent shops where self-employed mechanics often worked more than 12 hours a day for extended periods of time. In the second place, there was, in many instances, a deterioration in the quality of work compared with prewar standards. Finally, the constant pressure of work during the war permitted much fuller utilization of labor time than in former years, when mechanics often had to spend much time waiting for job assignments. The American Automobile Association found, for example, that in 12,000 of its official garages, the average number of hours spent on repair work increased from 5.8 per man-day in 1941 to 7.5 in 1942.⁴ This upward trend in labor utilization undoubtedly continued during 1943 and 1944 as more shops closed and employment continued to decline.

Altogether, in view of the many difficulties with which they have been confronted, the automotive-maintenance industry and its workers achieved a remarkable degree of success in keeping the Nation's aging motor vehicles in operative condition. Since millions of workers in war-industry centers depended upon the passenger car and bus to transport them to work and since trucks and intercity busses carried unprecedented traffic loads, this accomplishment was an important contribution to the war effort.

Employment Prospects

Rising employment of automobile mechanics during the transition period may be confidently predicted. In these early postwar years, the need for mechanics' services will be greater than during the war, because more liberal supplies of gasoline, tires, and repair parts will permit increased use of aging vehicles. Moreover, the release of skilled workers from the armed forces and war industries will tend, by and of itself, to raise the number employed in many repair shops which even before the end of the war were in need of additional help. Whether employment of mechanics will continue to rise after large numbers of new cars become available and the labor deficit has been made up will, however, depend largely on the number of automobiles then in operation. It is necessary, therefore, to examine the prospects with respect to motor-vehicle registrations, as a basis for estimating future employment and, ultimately, for considering how job openings are likely to compare with the numbers of trained workers who are potential entrants into the occupation.

TREND OF MOTOR-VEHICLE REGISTRATIONS

Between the advent of the automobile and the entrance of the United States into World War II, there were only 4 years in which motor-vehicle registrations failed to increase—1931–33 and 1938—all years of deep depression. The most spectacular upward climb of course occurred during the first years in the automobile's history, from 1905 through 1917, as the chart (p. 8) indicates. After 1926, a marked leveling off in the growth curve was evident, but the peak in registrations was not reached until 1941, when 29.5 million passenger

⁴ *Automotive Digest* (Cincinnati, Ohio), March 1943, p. 12.

cars and 4.9 million busses and trucks were on the roads. This was an average of one vehicle for every 3.9 persons in the population, the highest ratio so far achieved in any year.

The rise in motor-vehicle registrations was not accompanied by a corresponding growth in production. Output for the domestic market (as measured by factory sales) has never yet regained the 1929 level of 4.62 million vehicles, although the 1941 production figure was nearly as high (4.58 million). During the intervening years, the number of new passenger cars, busses, and trucks reaching the market fluctuated widely but, nevertheless, exceeded the number of old vehicles scrapped in all except the four depression years mentioned above, when there were slight declines in registrations.

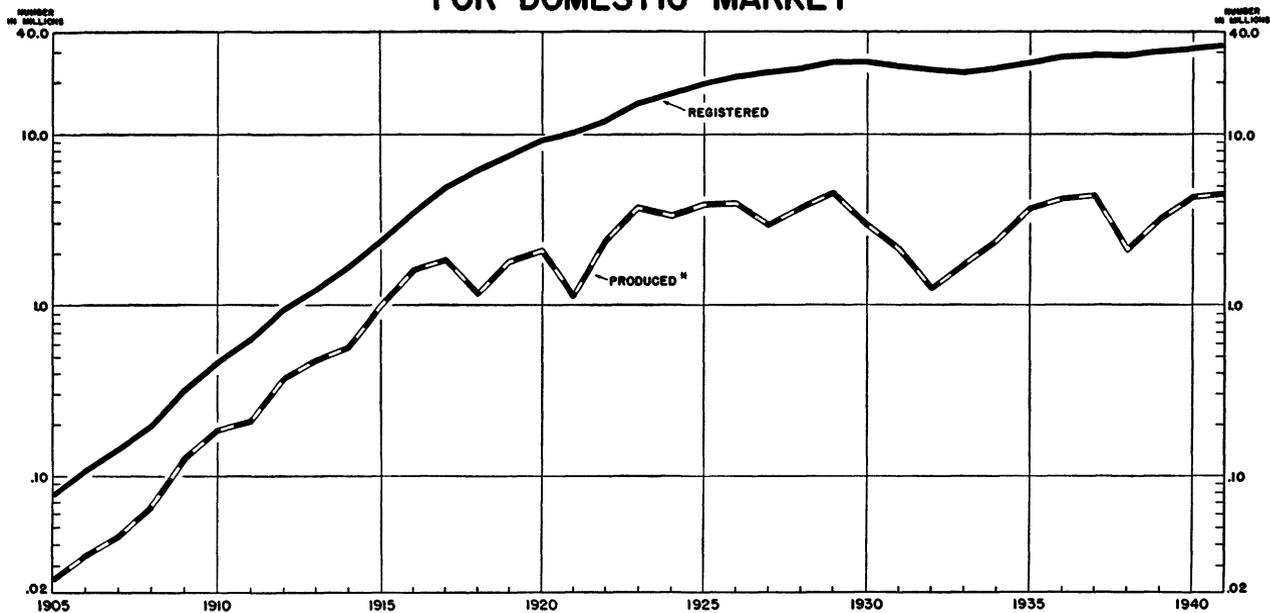
On the other hand, production has greatly exceeded the gain in registrations in all years after 1926. Sales of new motor vehicles have been largely for replacements, and the number of new owners purchasing cars have tended to decrease. There is, however, no evidence that the saturation point in vehicle ownership has been reached or closely approached. In fact, had the war not intervened, the level of vehicle ownership would probably have continued to rise, though at a decreasing rate, for at least another decade.

During the war, production of passenger cars was prohibited and output of commercial vehicles for civilian use drastically curtailed. Some new vehicles were available from the stockpile built up before the war, but the number of these was very limited. In consequence, registrations declined sharply. The number of passenger cars registered decreased from 29.5 million in 1941 to 25.3 million in 1944, a drop of 14 percent. Truck and bus registrations dropped almost 8 percent in the same period, from 4,948,000 in 1941 to 4,576,000 in 1944, despite the imperative need for continued operation of all available commercial vehicles.

The backlog of demand for new vehicles which was created for the immediate postwar years is only partially indicated by comparing present registrations with the 1941 figure. In the first place, had the prewar upward trend in registrations continued, many new vehicle buyers would have entered the market. Secondly, a tremendous number of vehicles will be scrapped as soon as replacements become available. According to the Office of Defense Transportation, the average age of passenger cars at the start of 1941 was 4½ years, whereas the average age at the beginning of 1945 was slightly over 7 years. The proportion of cars under 3 years of age fell from 30 percent to only 2 percent during the same period, while the proportion 7 years old and over rose from about 35 to 60 percent. The average age of commercial vehicles has undoubtedly risen also, although comparative figures are not available.

The deterioration which has resulted from this increase in vehicle age is obviously great although probably less, on the average, than would have occurred under normal conditions, since rationing of tires and gasoline during the war restricted the use of most passenger cars. On the other hand, some cars were not used often enough to keep them in good condition, while a few other cars and most trucks and busses were operated more intensively than before the war. Because of this situation and also because of the shortage of mechanics and replacement parts, a considerable number of vehicles deteriorated far more rapidly than they would have in peacetime.

MOTOR VEHICLES REGISTERED AND NUMBER PRODUCED FOR DOMESTIC MARKET



UNITED STATES DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS

*PRODUCTION AS MEASURED BY FACTORY SALES DATA FOR YEARS
PRIOR TO 1921 INCLUDE EXPORTS

Sources: AUTOMOBILE MANUFACTURERS ASSOCIATION
U. S. PUBLIC ROADS ADMINISTRATION
U. S. DEPT. OF COMMERCE, BUREAU OF THE CENSUS

The deferred demand for new vehicles thus built up has been estimated by Government and industry experts at 12 to 15 million passenger cars and perhaps 2½ million commercial vehicles. In their opinion, there will be an unprecedented annual output when full-scale production is resumed and a rise in registrations above the 1941 peak figure.

The estimates of future production and registrations arrived at in the present study are in line with this view. They are based upon an examination of the above indicated long-term trends and wartime developments and of several different postwar estimates, supplemented by consultation with a number of persons closely acquainted with the field. It is assumed, for the purposes of this study, that the levels of general business activity will be favorable. Estimates of total yearly production, rising well above the record 1929 level, were the starting point of the calculations. To adapt these figures for use in estimating registrations, an allowance was made for inventory requirements and for exports—yielding estimates of the number of vehicles likely to reach domestic consumers. The number of cars, trucks, and busses that will be scrapped each year was also estimated—at much higher figures than prevailed before the war, as would be expected in view of the present age and condition of the country's motor vehicles. Adding the estimated sales of new vehicles to 1944 registrations and subtracting the scrappage estimates yielded the following figures on passenger-car and commercial-vehicle registrations through 1950:

	<i>Estimated registrations (in millions) of—</i>		
	<i>Passenger cars</i>	<i>Trucks and busses</i>	<i>Total vehicles¹</i>
1944 ²	25.3	4.5	29.8
1945	23.4	4.7	28.1
1946	23.9	4.9	28.8
1947	26.0	5.1	31.1
1948	28.2	5.3	33.5
1949	30.5	5.5	36.0
1950	33.3	5.8	39.1

¹ Registrations are as of end of the year and are exclusive of publicly owned vehicles. It is assumed that the number of such vehicles will remain fairly constant in the postwar years. It is possible that future registrations will be higher than estimated if low-priced cars modeled on the style of the Army Jeep will be produced on a large scale. However, there is no way at present of ascertaining how many of these cars could be sold, and the effect such sales might have upon the sales of other cars or upon the over-all need for mechanics' services.

² Source: Public Roads Administration, exclusive of publicly owned vehicles.

The 1950 registration estimates would represent a gain of 4.7 million motor vehicles above the 1941 level—a rise quite in line with the long-term trend which, as previously noted, has been ascending at a decreasing rate. If, as expected, the population of the United States reaches 144½ million by 1950, the figures would mean one motor vehicle for every 3.7 persons in that year, compared with a ratio of 3.9 in 1941. This too would be consistent with prewar trends, which suggest a continued slow rise in the ratio of vehicles to population.

PROSPECTIVE LABOR DEMAND AND SUPPLY

The number of automobile mechanics needed in the next few years will of course depend not only on motor-vehicle registrations but also on labor requirements per vehicle—which will, in turn, be determined by such factors as working hours, labor productivity, and vehicle age and utilization.

During the war there was a sharp rise in the number of registered vehicles per employed mechanic, reflecting the greater drop in employment than in registrations. This change was, however, the result of wartime conditions which are unlikely to survive the transition period. With the freeing of gasoline, tires, and replacement parts, cars will probably once again be used with somewhat the same frequency as before the war. Because many repair shops will soon be opened, the total volume of repair work will be divided among more shops and the steady pressure of incoming work which permitted fuller utilization of labor time during the war will no longer prevail. In addition, the quality of work and the number of working hours will probably return to prewar levels, thereby eliminating the other factors which made possible increased output per mechanic during the war.

It is possible that a more widespread use of testing instruments and the introduction of improved devices will in the future enable mechanics to complete repairs and replacements more quickly, but this type of change will play a relatively insignificant role in determining total demand for mechanics in the next 5 years. It is also possible that there may be an increasing number of large departmentalized shops, and this would tend to raise productivity and correspondingly to lower labor requirements. On the other hand, many returning veterans may open their own small garages, which would be an offsetting factor.

Future demand for mechanics will also be influenced by the durability of new vehicles, the frequency with which vehicles will be operated, and the extent to which factories undertake the repair of motors and other parts. Unfortunately, it is not possible at this time to gage the effect of such changes or the extent to which one factor will offset another. Expert opinion indicates, however, that passenger cars will not differ radically from prewar models in the early postwar years. As in the past, improvements and changes will be introduced slowly.

One factor—the temporary increase in vehicle age—will certainly tend to raise the amount of repair work needed per vehicle above prewar requirements. According to the estimated rates of production and scrappage, about 50 percent of the registered passenger cars will still be 7 years old and over from 1946 through 1948, as contrasted with only 34 percent in 1940, although the number and proportion under 3 years old will rise rapidly and the average age of all cars will decrease. By 1950, a greater proportion of cars will be under 3 years old than in 1940, but the average age of all cars and the proportions under 7 years and 7 years and over will be approximately the same as in that year. Similarly, the average age of commercial vehicles will fall rapidly from 1946 onward and, by 1950, will probably be much the same as before the war.

Altogether, it appears reasonable to assume that the relationship between the number of motor vehicles and the employment of automobile mechanics in 1950 will approximate the 1940 situation—when there were 85 registered vehicles for every employed automobile mechanic in the country.⁵ On the basis of this ratio and of the estimated number of registered motor vehicles for 1950, then, employ-

⁵ Although the ratio varied to a certain extent from State to State, analysis of the relationship between the number of employed automobile mechanics and the number of registered vehicles in 1940—the only year for which complete data are available—revealed a high degree of correlation. Using data for the 48 States and the District of Columbia, the coefficient of correlation was 0.97.

ment of automobile mechanics may be expected to rise by that year to about 460,000. Even under the highest estimates as to future production of motor vehicles, if Nation-wide full employment should be achieved, the number of vehicles in use would be less than 10 per cent higher than is assumed here; but employment of automobile mechanics would not by any means be correspondingly greater, since the average age of vehicles would be lowered and the amount of repair work needed per vehicle would also drop. The level of employment estimated here for 1950 would be a gain of only about 80,000 over 1940 employment and not quite 20,000 over the total 1940 labor force (including experienced unemployed). However, it would mean an increase of roughly 235,000 compared with the estimated 1944-45 level of employment. The intervening years will witness, first, a sharp increase which will rapidly return employment to the prewar level and, subsequently, a continued rise at a slower pace.

In addition, some employment opportunities will, of course, be created by deaths and retirements, and transfers to other types of work. It is estimated that in the immediate postwar period there will be about 5 to 6 thousand job openings each year owing to death and retirement of employed automobile mechanics. Job openings arising from departures to other occupations will undoubtedly be much less numerous and will occur chiefly among the less skilled men, since for highly skilled workers with several years experience, such a change would generally mean starting at a lower level with a consequent decrease in earnings.

Despite the anticipated rapid rise in employment and the additional job openings which will arise owing to withdrawals from the occupation, the over-all employment outlook for automobile mechanics is unfavorable, because of the great number of persons who will probably seek work in the trade. According to data obtained from the War Department, there were in the Army alone as of a recent date about 200,000 enlisted personnel and more than 25,000 civilian employees performing work which is comparable to the duties of automobile mechanics in civilian life. Not all of these persons, of course, will want to remain in the occupation. Nevertheless, the number of men seeking mechanics' jobs after release from the Army will be tremendous, especially in view of the great number of enlisted men with civilian experience in this field—estimated now at about 140,000.

No statistics are available regarding Navy, Marine Corps, and Coast Guard personnel engaged in automotive repair work, but it is estimated that more than 25,000 former automobile mechanics entered these branches of the armed forces during the war. Furthermore, as mentioned previously, a great many mechanics left the trade to enter war industries. Two surveys conducted by the National Automobile Dealers' Association in 1942 and 1943 revealed that the number leaving repair shops for this reason was much greater than the number diverted to the armed forces. No doubt many of the former group later entered the armed forces, but if only half as many mechanics were in war industries at the end of the war as entered the armed forces, which appears a conservative assumption, the figure would run well into the tens of thousands, and it is likely that most of these men will wish to return to the trade now that the war is over.

Taking into consideration all these groups of potential entrants into the labor market, the conclusion is inescapable that job seekers will be more numerous than job openings in the occupation for several years after the war, except perhaps during the transition months. Nevertheless, the comparatively small group of fully qualified all-round mechanics and specialists are not likely to encounter much difficulty in obtaining employment. Much of the wartime training, both in civilian life and in the armed forces, was designed to produce, as quickly as possible, mechanics able to perform some of the simpler types of maintenance work under the supervision of more skilled workers. Many employers have been eagerly awaiting the return of the fully qualified men from the armed forces and war industries. In addition, because of their knowledge and experience, some of the highly skilled men may be able to open and succeed in their own business. For less skilled workers and, still more, for persons without any previous experience in the occupation, the Nation-wide employment outlook is unfavorable, although opportunities may of course be better in some local areas than others. Not only will there be an oversupply of partly trained mechanics but many persons have acquired skills in other types of work, such as aircraft engine maintenance, which would make it comparatively easy for them to learn and perform the duties of automobile mechanics, should they wish to enter the trade.

Education and Training

In view of the anticipated oversupply of automobile mechanics, young people who plan to enter this field should weigh carefully the obstacles which will confront them. For those who hope to enter the occupation despite the obstacles, the best type of preparation depends upon the prospective mechanic's age.

Young people under 18 should, if possible, complete at least 2 years of high school before looking for work or entering a vocational school. Even though there are no standard educational requirements in the trade, mechanics need to be able to read and understand easily trade journals, technical factory bulletins, and mechanical books, so that they can keep track of the changes in design and construction which the automotive industry introduces from year to year. Moreover, additional education enhances the chances for promotion to more responsible positions. Courses in English, general science, elementary physics, and mathematics are particularly valuable. Vocational-school training may also facilitate job progress, provided that the standards of the school are satisfactory and that actual conditions in the trade are adequately reproduced. Information regarding training programs and location of vocational schools is obtainable from local superintendents of schools and State supervisors for trade and industrial education. For the person over high-school age, the best and shortest way to become a skilled mechanic is to find employment in a repair shop, learn on the job from experienced men, and concurrently supplement this experience with trade-extension training in related technical subjects.

The prospective mechanic should seek to acquire a general knowledge of the construction and functioning of the motor vehicle because of the competitive advantages enjoyed by the all-round mechanic,

compared with the repairman whose knowledge and skill are limited to only one or a few types of repair work. The all-round man is able to obtain employment more readily in a repair shop of any size, regardless of whether the shop is departmentalized. In a departmentalized shop, he can transfer to another department which may be busier at the time when his regular work falls off. This is particularly important in view of the commission method of wage payment which prevails in many repair shops, both large and small, since in these circumstances ability to transfer from one type of work to another tends to reduce weekly fluctuations in earnings. Promotions to supervisory positions such as shop foreman, trouble shooter, or service manager is usually limited to all-round mechanics, because positions of this type require an ability to understand and check all kinds of work performed in the shop. Finally, an all-round knowledge of the occupation is of great value to the mechanic who plans to open his own garage.

Although a few months' experience and training are sufficient to equip a man to perform some of the simpler types of repair work, it generally takes 3 to 4 years to become a fully qualified mechanic. For all-round mechanics to become specialists, of course, requires additional time and study. However, it is possible for the man with a knack for handling metal to become a skilled body repairman in 2 to 3 years, since it is not necessary for him to acquire a technical knowledge of the construction and operation of the vehicle.

Unfortunately, no standard training methods prevail in the automotive-maintenance industry and the prospective mechanic generally has had to plan his own training. Boys going to work in the trade have usually started out in such jobs as helper, greaser, or washer, although it is sometimes possible to start as an apprentice. Where there are strict apprenticeship standards, as in the State of Washington, the apprentice receives prescribed on-the-job training in all types of repair work with a view toward becoming an all-round mechanic, and in addition he is required to attend night school for at least 144 hours per year throughout the apprenticeship period. At the end of the fourth year, the apprentice must pass an examination to qualify as a journeyman.

During the war, interest in systematic training was widely stimulated. For example, the Rhode Island Dealers Association, in cooperation with the State Department of Education and the War Manpower Commission, inaugurated early in 1944 an apprenticeship system similar to that in Washington. Under the Rhode Island plan, the applicant must have completed at least 2 years of high school in addition to passing tests for mechanical aptitude and general intelligence.

On the other hand, much of the wartime training both in civilian life and in the armed forces, as previously indicated, was designed to produce single-skill mechanics in as short a time as possible. Hence, if they wish to advance, many wartime trained mechanics will have to supplement their present knowledge and skill with additional schooling and on-the-job training.

Many of the wartime inaugurated training programs will not only be continued but broadened, now that the war is over, and other States are likely to duplicate the Washington and Rhode Island systems of apprenticeship. In the future, therefore, more systematic training

methods and stricter requirements with respect to education and mechanical aptitude may be expected throughout the trade.

Earnings and Working Conditions

Earnings and working conditions of automobile mechanics, like those of workers in many other service trades, vary widely. Some mechanics are in as favorable an economic position as skilled workers in major industries, but others continue to have relatively low wages and a poor working environment—a fact which accounts at least in part for the great exodus of mechanics to other jobs during the war.

HOURS AND EARNINGS

Typical earnings of experienced automobile mechanics before the wartime increases in wage rates were from \$20 to \$35 for a 40- to 60-hour workweek, according to studies of the occupation in three States—Georgia, Illinois, and Ohio—made by the National Youth Administration in 1938 and 1939. Learners were found to be earning much less, from \$5 to \$20 a week, while a few highly skilled mechanics were paid as high as \$75.

Information on wartime earnings which is both more comprehensive and more reliable was obtained by the Bureau of Labor Statistics through Nation-wide studies of hourly wage rates and straight-time hourly earnings (in the case of mechanics paid on a commission basis) in selected areas in 1943 and 1944.⁶ From the 1943 study, which was much the broader of the two and therefore more representative of the country as a whole, estimates of average straight-time hourly earnings and wage rates (including incentive payments but excluding premium payments for overtime and late-shift work) of general automobile mechanics are available for each of 279 wage areas scattered throughout the country.⁷ Altogether, 13,780 general automobile mechanics were covered. Comparable estimates covering 4,552 body repairmen and 2,798 greasers are also available for a somewhat smaller number of areas. In addition, supplementary information was secured on such aspects of working conditions as hours of work, provisions for premium pay and paid vacations, and existence of union agreements.

Straight-time average hourly earnings of general automobile mechanics in most (87 percent) of the areas surveyed in 1943 were between 70 cents and \$1.20 (table 2). Earnings were found to vary greatly not only in the country as a whole but also within regions and between cities of similar size, in terms of population. In general, however, earnings were slightly higher in the West Coast area than in other regions and also tended to be higher in large than in small cities. Practically all areas with average earnings under 90 cents had less than 100,000 population, while the greatest concentration of average

⁶ The information for each wage area covered was based in some instances upon all, in others upon a sample, of the automobile-repair establishments. Although fleet-repair shops, such as those maintained by breweries, dairies, and coal companies, were included in a few areas, coverage in most instances was restricted to general independent and dealer repair shops. Establishments specializing in one type of service exclusively, such as body or electrical repair, were excluded. Except in a relatively few cases, establishments with less than nine employees were also not covered. To the extent that large shops pay more than small shops, therefore, the average hourly earnings may be overstated.

⁷ The 1943 survey covered about 70 percent of the cities in the country with a population of 100,000 and over and about 40 percent of those between 25,000 and 100,000, but less than 2 percent of those under 25,000. However, the bulk of automobile mechanics work in the larger cities.

earnings in the larger areas was between 90 cents and \$1.20. As table 2 indicates, median area-average earnings for general automobile mechanics in cities under 100,000 population were 88 cents compared with \$1.02 in cities over 100,000.

In the less extensive survey conducted by the Bureau in 1944, a separation was made between fully qualified (grade A) mechanics and less skilled (grade B) men performing less varied and simpler tasks. In nearly all of the areas covered in 1944, the average earnings of grade B mechanics were from 60 cents to \$1.10 and of grade A mechanics from 90 cents to \$1.40. Median area-average earnings for grade B men were 79 cents an hour, compared with \$1.16 for grade A men.

Body repairmen generally made, on the average, several cents more an hour than general mechanics in 1943, although for them as for all-round men straight-time average hourly earnings were between 70 cents and \$1.20 in most of the areas surveyed. The earnings of greasers—which suggest the range of pay for beginners, since many mechanics have in the past entered the trade through initial work of this type—were, of course, much lower than those of body repairmen and general automobile mechanics. Average hourly earnings of these semiskilled men were between 40 and 70 cents in most of the selected wage areas.

Because these earnings data are averages for wage areas comprising an entire city, a city and its environs, or two or more neighboring communities believed to have similar wage rates, the more extensive range of individual earnings is obscured. Striking illustration of this is provided by earnings in the Detroit wage area in 1943. General automobile mechanics in this area averaged \$1.42 an hour. However, the lowest and highest establishment averages were, respectively, 74 cents and \$2.56 an hour, and the range in earnings of individual mechanics was still wider.

The individual's skill and the type of shop in which he is employed greatly influence his rate of pay. The method of wage payment may also affect earnings. During the war, mechanics paid on a commission basis (usually 40 to 50 percent of the standard price of completed work, exclusive of the cost of replacement parts) generally earned slightly more per hour than those paid an hourly rate, and, other conditions being equal, also had higher weekly earnings. Other factors which influence weekly earnings are the number of hours worked per week, whether the shop where the mechanic is employed provides for premium rates of pay, and the number of hours required in such shops before premium pay becomes effective. Weekly earnings of self-employed mechanics probably have varied to a greater extent than those of other mechanics, depending not only on the individual's business ability and knowledge of the trade but also on the number of mechanics working for him.

The number of hours of work per week in automotive-repair establishments varied considerably before and during the war. Under the customary 5- to 6-day workweek and 8- to 10-hour day, typical working hours for automobile mechanics ranged from 40 to 60 hours a week. For example, in 257 automotive-repair establishments in 10 Ohio wage areas studied by the Bureau during 1944, the standard workweek was in all instances within this range of 40 to 60 hours, and in nearly seven-eighths of the shops was from 44 to 52 hours.

TABLE 2.—Area-Average Straight-Time Hourly Earnings for General Automobile Mechanics, Body Repairmen, and Greasers; Selected Wage Areas, March–October 1943

Average hourly earnings (per wage area)	General automobile mechanics		Body repairmen, metal		Greasers	
	Number of wage areas	Percent	Number of wage areas	Percent	Number of wage areas	Percent
All areas						
\$0.30 and under \$0.40					26	10.2
\$0.40 and under \$0.50					54	21.2
\$0.50 and under \$0.60	2	0.7	4	1.6	63	24.7
\$0.60 and under \$0.70	13	4.6	13	5.1	52	20.4
\$0.70 and under \$0.80	64	22.9	45	17.5	23	9.0
\$0.80 and under \$0.90	46	16.5	44	17.1	25	9.8
\$0.90 and under \$1.00	47	16.8	33	12.8	12	4.7
\$1.00 and under \$1.10	42	15.2	45	17.5		
\$1.10 and under \$1.20	43	15.4	37	14.4		
\$1.20 and under \$1.30	13	4.6	17	6.6		
\$1.30 and under \$1.40	3	1.1	8	3.1		
\$1.40 and under \$1.50	5	1.8	6	2.3		
\$1.50 and over	1	0.4	5	1.9		
Total	279	100.0	257	100.0	255	100.0
Median hourly earnings	\$0.92		\$0.97		\$0.57	
Areas under 100,000 population						
\$0.30 and under \$0.40					22	11.6
\$0.40 and under \$0.50					49	25.9
\$0.50 and under \$0.60	2	0.9	4	2.1	52	27.5
\$0.60 and under \$0.70	13	6.1	11	5.8	32	16.9
\$0.70 and under \$0.80	59	27.8	43	22.5	16	8.5
\$0.80 and under \$0.90	43	20.3	39	20.5	14	7.4
\$0.90 and under \$1.00	27	12.7	26	13.7	4	2.1
\$1.00 and under \$1.10	25	11.8	24	12.6		
\$1.10 and under \$1.20	30	14.2	22	11.6		
\$1.20 and under \$1.30	8	3.8	10	5.3		
\$1.30 and under \$1.40	1	0.5	6	3.2		
\$1.40 and under \$1.50	3	1.4	2	1.1		
\$1.50 and over	1	0.5	3	1.6		
Total	212	100.0	190	100.0	189	100.0
Median hourly earnings	\$0.88		\$0.89		\$0.54	
Areas of 100,000 population and over						
\$0.30 and under \$0.40					4	6.0
\$0.40 and under \$0.50					5	7.6
\$0.50 and under \$0.60					11	16.7
\$0.60 and under \$0.70			2	3.0	20	30.3
\$0.70 and under \$0.80	5	7.5	2	3.0	7	10.6
\$0.80 and under \$0.90	3	4.5	5	7.5	11	16.7
\$0.90 and under \$1.00	20	29.8	7	7.5	8	12.1
\$1.00 and under \$1.10	17	25.3	21	31.2		
\$1.10 and under \$1.20	13	19.4	15	22.3		
\$1.20 and under \$1.30	5	7.5	7	7.5		
\$1.30 and under \$1.40	2	3.0	2	3.0		
\$1.40 and under \$1.50	2	3.0	4	6.0		
\$1.50 and over			2	3.0		
Total	67	100.0	67	100.0	66	100.0
Medium hourly earnings	\$1.02		\$1.07		\$0.67	

Premium pay for work in excess of a stipulated number of hours a day or week or both is provided for in some shops and apparently became more common during the war. Of the 257 establishments covered in the Ohio wage areas mentioned above, 101 paid time and one-half for work beyond a specified number of hours in 1 week (40

hours in 55 repair shops, 44 hours in 29, and 48 in the remaining 17). Only 42 shops reported provisions for payment of premium rates for hours of work in excess of a stipulated number in 1 day, most of these paying time and a half for work beyond 8 hours. This situation with respect to overtime-pay provisions appeared to be fairly typical, except that in a few shops in other areas premium rates did not start before 50 or even 60 hours a week.

During the war, there was a marked increase in weekly earnings of automobile repairmen, in line with the general upward movement in wages. The average straight-time hourly earnings of general mechanics and body repairmen in most of the areas surveyed in 1943 suggest a typical wage range of \$28 to \$48 even for a 40-hour workweek, and actual average weekly earnings were no doubt generally higher. For example, the range of average weekly earnings for general mechanics and body repairmen employed in shops which averaged 50 hours a week and paid time and one-half after 44 hours would be \$37 to \$64.

Annual earnings depend upon regularity of employment, in addition to the factors discussed above. In recent years, employment and earnings generally have not varied very much from one month to another. Where there are slight seasonal fluctuations in volume of work, these are more likely to result in somewhat lower or higher weekly earnings, particularly in the case of mechanics paid on a commission basis, than in a complete loss of pay because of lay-off. Mechanics are more likely to be laid off in the winter months in small northern towns than elsewhere, but even in the northern part of the country most repair shops employ a fairly steady force throughout the year. Less frequent utilization of passenger cars during the winter months in these States is partly offset by the additional stress to which vehicles are subjected in cold weather. Passenger cars nowadays are rarely stored for the entire winter, since better roads and speedy removal of snow, together with the widespread use of heaters and general improvement of passenger cars, have made possible increased winter driving. Furthermore, trucks, busses, taxis, and local delivery vehicles operate to about the same extent in all types of weather, and consequently require additional repair servicing in the colder months. There is usually a slight increase in activity during the spring in most parts of the country, because of motorists' preparation for vacation travel, and extra temporary help may then be hired in some instances.

OTHER WORKING CONDITIONS

The lack of uniformity in earnings and working conditions in the automotive-maintenance industry may be attributed at least in part to the fact that unionization is not very extensive, which in turn is due partly to the wide dispersal of automotive-repair shops and the prevalence of shops employing only a few automobile mechanics. Of 3,083 automotive-repair establishments surveyed by the Bureau in 1943, only 13 percent had union agreements covering substantial proportions of the employees. The highest proportion of unionization was found in the Pacific region, where almost 40 percent of the establishments were covered by union agreements. The major unions for automobile mechanics are the United Automobile, Aircraft and Agricultural Implement Workers of America (CIO), the bulk of whose

membership is concentrated in and around Detroit, and the International Association of Machinists (AFL), which has locals in many parts of the country. In addition, automobile mechanics have been organized by locals of other national unions, as well as by independent, local unions. Workers in union shops generally earn more than those in nonunion shops.

Policies concerning vacations with pay depend upon the individual repair shop. In some instances, mechanics receive either a 1- or 2-week vacation with pay after 1 year of service. Sometimes the length of the vacation is increased after 2 to 5 years of continuous employment in the same establishment. It appears that the practice of providing paid vacations to automobile mechanics became more common during the war years.

The physical conditions under which the automobile mechanic works vary greatly depending on the particular shop in which he is employed. Some repair shops, particularly the larger ones, have installed modern equipment and facilities, thus reducing accident and health hazards and also the physical discomfort which may be associated with some parts of the work. Other shops fail to provide adequate heating, lighting, and ventilation. In such shops especially, the mechanic may be subject to nausea and headache from motor-exhaust fumes. In addition, there may be danger of injury to men working under vehicles supported on jacks or blocking.

Generally, the mechanic's work is performed inside a shop during the day. However, it is occasionally necessary for him to perform emergency repairs outside the shop in the open. In shops which service trucks, busses, or taxis, the work may be regularly performed at night. In most jobs the mechanic handles greasy tools and parts, and it is often necessary for him to stand or lie in awkward and cramped positions for extended periods of time. Sound health and at least average physical endurance, in addition to mechanical aptitude, are therefore essential qualifications for automotive-repair work.