Focusing on motor vehicle and machinery repairers, this document is one in a series of forty-one reprints from the Occupational Outlook Handbook providing current information and employment projections for individual occupations and industries through 1985. The specific occupations covered in this document include: automobile body repairers, automobile mechanics, automobile painters, automobile parts counter workers, automobile service advisors, boat-engine mechanics, diesel mechanics, farm equipment mechanics, gasoline service station attendants, motorcycle mechanics, truck mechanics, and bus mechanics. The following information is presented for each occupation or occupational area: a code number referenced to the Dictionary of Occupational Titles; a description of the nature of the work; places of employment; training, other qualifications, and advancement; employment outlook; earnings and working conditions; and sources of additional information. In addition to the forty-one reprints covering individual occupations or occupational areas (CE 017 757-797), a companion document (CE 017 756) presents employment projections for the total labor market and discusses the relationship between job prospects and education. (EM)
Every day thousands of motor vehicles are damaged in traffic accidents. Although some are wrecked, most can be made to look and drive like new. Automobile body repairers are the workers who straighten bent frames, remove dents, and replace crumpled parts that are beyond repair. Usually, they can fix all types of vehicles, but most repairers work mainly on cars and small trucks. A few specialize in working on larger trucks, buses, or tractor trailers.

When a damaged vehicle is brought into the shop, body repairers generally receive instructions from their supervisors, who have determined which parts are to be restored or replaced and how much time the job should take.

Automobile body repairers use special machines to align damaged frames and body sections. They chain or clamp the semi-portable alignment machine to the damaged metal and apply hydraulic pressure to straighten it.

Body repairers remove badly damaged sections of body panels with a pneumatic metalcutting gun or acetylene torch, and weld in new sections to replace them. Sometimes, dented sections can be repaired rather than replaced; the repairers push dents out with a hydraulic jack or hand prying bar, or knock them out with a hand tool or pneumatic hammer. Small dents and creases can be smoothed out by holding a small anvil against one side of the damaged area while hammering the opposite side. Very small pits and dimples are removed with pick hammers and punches.

Some small dents cannot be worked out of the metal. Body repairers fix these dents by first filling them with plastic or solder. Then, when the filler hardens, they file or grind it to its original shape and sand it smooth for painting. In most shops, automobile painters do the painting.

Places of Employment

About 174,000 persons worked as automobile body repairers in 1976. Most worked for shops that specialized in body repairs and painting, and for automobile and truck dealers. Other employers included organizations that maintain their own motor vehicles, such as trucking companies and bus lines. Motor vehicle manufacturers employed a small number of these workers.
Persons who want to learn this trade should be in good physical condition and know how to use tools. Courses in automobile body repair offered by high schools, vocational schools, and private trade schools provide helpful experience, as do courses in automobile mechanics. Although completion of high school generally is not a requirement, many employers believe graduation indicates that the person has at least some of the qualities of a good worker, such as the ability to see a task through to its completion. The latter is especially important as employers spend a good deal of time and money on training.

Automobile body repairers must buy hand tools, but employers usually furnish power tools. The usual pattern is for trainees to accumulate tools as they gain experience. Many workers have a few hundred dollars invested in tools.

An experienced automobile body repairer with supervisory ability may advance to shop supervisor. Many workers open their own body repair shops. In fact, about one of every eight automobile body repairers is self-employed.

Employment Outlook

Employment of automobile body repairers is expected to increase about as fast as the average for all occupations through the mid-1980's. Employment is expected to increase as a result of the rising number of motor vehicles damaged in traffic. Accidents are expected to increase as the number of motor vehicles grows, even though improved highways, driver training courses, lower speed limits, and improved bumpers and safety features on new vehicles may slow the rate of increase.

In addition to the job openings from employment growth, many openings are expected each year from the need to replace experienced repairers who retire or die. Also job openings will occur as some workers transfer to other occupations.

Most persons who enter the occupation may expect steady work since the automobile repair business is not very sensitive to changes in economic conditions.

Earnings and Working Conditions

Body repairers employed by automobile dealers and repair shops estimated average hourly earnings of $8.20 in 1976, about one and three-fourths times the average for all nonsupervisory workers in private industry, except farming. Skilled body repairers usually earn between two and three times as much as inexperienced helpers and trainees.

Many body repairers employed by automobile dealers and repair shops are paid a commission, usually about half of the labor cost charged to the customer. Under this method, earnings depend on the amount of work assigned to the repairer and how fast it is completed. Employers frequently guarantee their commissioned workers a minimum weekly salary. Helpers and trainees usually receive an hourly rate until they are skilled enough to work on commission. Body repairers who work for trucking companies, businesses, and other organizations that maintain their own vehicles usually receive an hourly wage. Most body repairers work 40 to 48 hours a week.

Automobile body shops are noisy because of the banging of hammers against metal and the whir of power tools. Most shops are well-ventilated, but often they are dusty and have the odor of paint. Body repairers often work in awkward or cramped positions, and much of their work is strenuous and dirty. Hazards include cuts from sharp metal edges, burns from torches and heated metal, and injuries from power tools.

Many automobile body repairers are members of unions, including the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the Sheet Metal Workers’ International Association; and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America (Ind.). Most body repairers who are union members work for large automobile dealers, trucking companies, and busineses. 

Sources of Additional Information

More details about work opportunities may be obtained from local employers, such as automobile body repair shops and automobile dealers; locals of the unions previously mentioned; or the local office of the State employment service. The State employment service also may be a source of information about apprenticeship and other programs that provide training opportunities.

For general information about the work of automobile body repair workers, write to:


Automotive Service Consultants Inc., 148 Industrial Dr., Suite 112, Elmhurst, Ill. 60126.

AUTOMOBILE MECHANICS

(D.O.T. 620.131 through .381, .782, and .885; 721.281 and 825.281)

Nature of the Work

Anyone whose car has broken down knows how important the automobile mechanic’s job is. The ability to make a quick and accurate diagnosis is one of the mechanic’s most valuable skills. It requires good reasoning ability as well as a thorough knowledge of automobiles. In fact, many mechanics consider diagnosing “hard to find” troubles one of their most challenging and satisfying duties.

When mechanical or electrical troubles occur, mechanics first get a description of the symptoms from the owner or, if they work in a dealership, the service advisor who wrote the repair order. If the cause of the trouble is hard to find, the mechanic may test drive the car or use testing equipment, such as motor analyzers, spark plug testers, or compression gauges, to locate the problem. Once the cause of the problem is found,
mechanics make adjustments or repairs. If a part cannot be fixed, they replace it.

Most automobile mechanics perform a variety of repairs; others specialize. For example, automatic transmission specialists work on gear trains, couplings, hydraulic pumps, and other parts of automatic transmissions. Because these are complex mechanisms, their repair requires considerable experience and training, including a knowledge of hydraulics. Tune-up mechanics adjust the ignition timing and valves, and adjust or replace spark plugs, distributor points, and other parts to ensure efficient engine performance. They often use scientific test equipment to locate malfunctions in fuel and ignition systems.

Automobile air-conditioning specialists install air-conditioners and service components such as compressors and condensers. Front-end mechanics align and balance wheels and repair steering mechanisms and suspension systems. They frequently use special alignment equipment and wheel-balancing machines. Brake mechanics adjust brakes, replace brake linings, repair hydraulic cylinders, and make other repairs on brake systems. Some mechanics specialize in both brake and front-end work.

Automobile-radiator mechanics clean radiators with caustic solutions, locate and solder leaks, and install new radiator cores. They also may repair heaters and air-conditioners, and solder leaks in gasoline tanks. Automobile-glass mechanics replace broken windshield and window glass and repair window operating mechanisms. They install preformed glass to replace curved windows, and they use window patterns and glass-cutting tools to cut replacement glass from flat sheets. In some cases they may repair minor damage, such as pits, rather than replace the window.

To prevent breakdowns, most car owners have their cars checked regularly and parts adjusted, repaired, or replaced before they go bad. This responsibility of the mechanic is vital to safe and trouble-free driving.

When doing preventive maintenance, mechanics may follow a checklist to be sure they examine all important parts. The list may include distributor points, spark plugs, carburetor, wheel balance, and other potentially troublesome items.

Places of Employment

Over 700,000 persons worked as automobile mechanics in 1976. Most worked for automobile dealers, automobile repair shops, and gasoline service stations. Others were employed by Federal, State, and local governments, taxi cab and automobile leasing companies, and other organizations that repair their own automobiles. Some mechanics also were employed by automobile manufacturers to make final adjustments and repairs at the end of the assembly line. A small number of mechanics worked for department stores that have automobile service facilities.

Most automobile mechanics work in shops that employ from one to five mechanics, but some of the largest shops employ more than 100. Generally, automobile dealer shops employ more mechanics than independent shops.

Automobile mechanics work in every section of the country. Geographically, employment is distributed about the same as population.

Training, Other Qualifications, and Advancement

Most automobile mechanics learn the trade on the job. Beginners usually start as helpers, lubrication workers, or gasoline station attendants, and gradually acquire skills by working with experienced mechanics. Although a beginner can make simple repairs after a few months' experience, it usually takes 3 to 4 years to become familiar with all types of repairs. An additional year or two is necessary to learn a difficult specialty, such as automatic transmission repair. In contrast, radiator mechanics, glass mechanics, and brake specialists, who do not need an all-round knowledge of automobile repair, may learn their jobs in about 2 years.

Most training authorities recommend a 3- or 4-year formal apprenticeship program. These programs include both on-the-job training and classroom instruction. On-the-job
training includes instruction in basic service procedures, such as engine tune-up, as well as instruction in special procedures such as overhauling transmissions. Classroom instruction includes courses in related theory such as mathematics and physics and other areas such as shop safety practices and customer relations.

For entry jobs, employers look for young persons with mechanical aptitude and a knowledge of automobiles. Generally, a driver's license is required as mechanics occasionally have to test drive or deliver cars. Working on cars in the Armed Forces or as a hobby is valuable experience. Completion of high school is an advantage in obtaining an entry job because most employers indicate that a young person has at least some of the traits of a good worker, such as perseverance and the ability to learn, and has potential for advancement. Courses in automobile repair offered by many high schools, vocational schools, and private trade schools also are helpful. In particular, courses in physical science and mathematics can help a person better understand how an automobile operates.

The usual practice is for mechanics to buy their handtools and beginners are expected to accumulate tools as they gain experience. Many experienced mechanics have several hundred dollars invested in tools. Employers furnish power tools, meanwhile a hundred dollars invested in tools. Many mechanics open their own repair shops or gasoline service stations and about 1 out of 7 automobile mechanics is self-employed.

Employment Outlook

Job opportunities for automobile mechanics will be plentiful in the years ahead. Because this is a large occupation, replacement needs are high. Then, in addition to openings that will be created by employment growth, thousands of job openings will arise each year due to the need to replace experienced mechanics who retire, die, or change jobs.

Employment of automobile mechanics is expected to increase about as fast as the average for all occupations through the mid-1980's. The number of mechanics is expected to increase because expansion of the driving age population and consumer purchasing power will increase the number of automobiles on the road. Employment also is expected to grow because a greater number of automobiles will be equipped with pollution control and safety devices, air-conditioning, and other features that increase maintenance requirements.

Most persons who enter the occupation may expect steady work because the automobile repair business is not much affected by changes in economic conditions.

Earnings and Working Conditions

Skilled automobile mechanics employed by automobile dealers in 36 cities had estimated average hourly earnings of $7.76 in 1976, about two-thirds more than the average for all nonsupervisory workers in private industry, except farming.

Many experienced mechanics employed by automobile dealers and independent repair shops receive a commission; usually about half the labor cost charged to the customer. Under this method, weekly earnings depend on the amount of work completed by the mechanic. Employers frequently guarantee commissioned mechanics a minimum weekly salary. Skilled mechanics usually earn between two and three times as much as inexperienced helpers and trainees.

Most mechanics work between 40 and 48 hours a week, but many work even longer hours during busy periods. Mechanics paid by the hour frequently receive overtime rates for hours over 40 a week.

Generally, mechanics work indoors. Modern automobile repair shops are well ventilated, lighted, and heated, but older shops may not have these advantages.

Mechanics frequently work with dirty and greasy parts, and in awkward positions. Many of the automobile parts and tools that they must lift are heavy. Minor cuts and bruises are common, but serious accidents can be avoided by keeping the shop clean and orderly and observing other safety practices.

Some mechanics are members of labor unions. Among the unions organizing these workers are the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the Sheet Metal Workers' International Association; and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America (Ind.).

Sources of Additional Information

For more details about work opportunities, contact local employers such as automobile dealers and repair shops; locals of the unions previously mentioned; or the local office of the State employment service. The State employment service also may have information about apprenticeship and other programs that provide training opportunities.

For general information about the work of automobile mechanics, write to:

- Automotive Service Industry Association, 230 North Michigan Ave., Chicago, Ill. 60601
- Automotive Service Councils, Inc., 188 Industrial Dr., Suite 112, Elmhurst, Ill. 60126
- National Automobile Dealers Association, 2000 K St. NW., Washington, D.C. 20006
AUTOMOBILE PAINTERS

Nature of the Work

Automobile painters make old and damaged motor vehicles "look like new." These skilled workers repaint older vehicles that have lost the luster of their original paint and make fender and body repairs almost invisible. (Painters who work on the production lines at motor vehicle manufacturing plants are discussed elsewhere in the Handbook.)

To prepare a automobile for painting, painters or their helpers remove the original paint or rust using air- or electric-powered sanders and a course grade of sandpaper. Before painting, they also must remove or protect areas which they do not want painted, such as chrome trim, headlights, windows, and mirrors. Painters or their helpers cover these areas with paper and masking-tape.

When the car is ready, painters use a spray gun to apply primer coats to the automobile surface. After each coat of primer dries, they sand the surface until it is smooth before applying another coat. Final sanding may be done by hand, using a fine grade of sandpaper. If the surface to be painted is not smooth, the paint job will be rough and uneven. Small nicks and scratches that cannot be removed by sanding are filled with automobile body putty.

Before painting repaired portions of an automobile, painters often have to mix paints to match the color of the car. This important part of the job can be very difficult when painting repaired parts of older cars because the original color often fades over the years.

Before applying paint, painters adjust the nozzle of the spray gun according to the kind of lacquer or enamel being used and, if necessary, they adjust the air-pressure regulator to obtain the correct pressure. If the spray gun is not adjusted properly, the paint may run or go on too thinly. To speed drying, they may place the freshly painted automobile under heat lamps or in a special infrared oven that is sealed to prevent dust and bugs from getting onto the fresh paint. After the paint has dried, painters or their helpers usually polish the newly painted surface.

Places of Employment

About 30,000 persons worked as automobile painters in 1976. Almost two-thirds worked in shops that specialize in automobile repairs. Most others worked for automobile and truck dealers. Some painters worked for organizations that maintained and repaired their own fleets of motor vehicles, such as trucking companies and lines.

Painters are employed throughout the country, but are concentrated in metropolitan areas.

Training, Other Qualifications, and Advancement

Most automobile painters start as helpers and gain their skills informally by working with experienced painters. Beginning helpers usually perform tasks such as removing automobile trim, cleaning and sanding surfaces to be painted, and polishing the finished work. As helpers gain experience, they progress to more complicated tasks, such as mixing paint to achieve a good match and using spray guns to apply primer coats and painting small areas. Becoming skilled in all aspects of automobile painting usually requires 3 to 4 years of on-the-job training.

A small number of automobile painters learn through apprenticeship. Apprenticeship programs, which generally last 3 years, consist of on-the-job training supplemented by classroom instruction in areas such as shop safety practices, proper use of equipment, and general painting theory.

Persons considering this work as a career should have good health, keen eyesight, and a good color sense. Courses in automobile-body repair offered by high schools and vocational schools provide helpful experience. Completion of high school generally is not a requirement but may be an advantage, because to many employers high school graduation indicates that the person has at least some of the traits of a good worker, such as reliability and perseverance.

An experienced automobile painter with supervisory ability may advance to shop supervisor. Many experienced painters with the necessary funds open their own shops.
Employment Outlook

Employment of automobile painters is expected to increase about as fast as the average for all occupations through the mid-1980's. In addition to jobs created by growth, several hundred openings are expected to arise each year because of the need to replace experienced painters who retire or die. Openings also will occur as some painters transfer to other occupations.

Employment of automobile painters is expected to increase primarily because more motor vehicles will be damaged in traffic accidents. As the number of vehicles on the road grows, accident losses will grow, even though better highways, lower speed limits, driver training courses, and improved bumpers and other safety features on new vehicles may slow the rate of growth.

Most persons who enter the occupation can expect steady work because the automobile repair business is not affected much by changes in economic conditions. Job opportunities will be best in heavily populated areas. Many shops in small cities do not have enough business to hire trainees.

Earnings and Working Conditions

Painters employed by automobile dealers in 36 large cities had estimated average hourly earnings of $8.50 in 1976, compared to an average of $4.87 for all nonsupervisory workers in private industry, except farming. Skilled painters usually earn between two and three times as much as inexperienced helpers and trainees.

Many painters employed by automobile dealers and independent repair shops receive a commission based on the labor cost charged to the customer. Under this method, earnings depend largely on the amount of work a painter does and how fast it is completed. Employers frequently guarantee their commissioned painters a minimum weekly salary. Helpers and trainees usually receive an hourly rate until they become sufficiently skilled to work on a commission basis. Trucking companies, buslines, and other organizations that repair their own vehicles usually pay by the hour. Most painters work 40 to 48 hours a week.

Automobile painters are exposed to fumes from paint and paint-mixing ingredients. In most shops, however, the painting is done in special ventilated booths that protect the painters. Painters also wear masks to protect their noses and mouths. Painters must be agile because they often bend and stoop while working to reach all parts of the car.

Many automobile painters belong to unions, including the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the Sheet Metal Workers' International Association; and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America (Ind.). Most painters who are union members work for the larger automobile dealers, trucking companies, and buslines.

Sources of Additional Information

For more details about work opportunities, contact local employers, such as automobile-body repair shops and automobile dealers; locals of the unions previously mentioned; or the local office of the State employment service. The State employment service also may be a source of information about apprenticeship and other programs that provide training opportunities.

For general information about the work of automobile painters, write:
Automotive Service Councils, Inc., 188 Industrial Dr., Suite 112, Elmhurst, Ill. 60126.

AUTOMOBILE PARTS COUNTER WORKERS

(D.O.T. 289.358)

Nature of the Work

Automobile parts counter workers sell replacement parts and accessories for cars, vans, trucks, and other motor vehicles. Those who work in wholesale parts stores sell parts that can be used on many makes and models of vehicles. Their customers include independent repair shops, service stations, self-employed mechanics, and "do-it-yourselfers." Counter workers employed in dealerships usually sell only parts that are made for the makes of vehicles sold by the dealers they work for and spend most of their time supplying parts to the mechanics who work in the dealers' repair shops.

Because of the wide variety of cars and trucks on the road and the growing complexity of automobiles, parts stores must stock thousands of parts ranging from carburetors to rear view mirrors. Parts counter workers must be able to quickly identify and locate any of these parts for their customers, even when customers provide only a general description of the items they want. In order to determine what their customers need, counter workers must have a good knowledge of parts catalogs. In addition, to locate the parts quickly they must be familiar with the layout of the stockroom. If a customer needs a part that is not stocked, counter workers may suggest that they use one that is interchangeable, place a special order for the part with the manufacturer, or refer the customer to another dealer or store.

Once they have obtained the parts the customers want, counter workers use price lists to determine the costs of the parts. They then fill out sales receipts and collect from their customers. When necessary they package items sold.

In addition to selling, counter workers keep parts catalogs and price lists up to date, replenish stock, and unpack incoming shipments. They also take care of the paperwork involved in selling, such as recording sales, taking inventories, and ordering parts from manufacturers. In large firms, stock and receiving clerks do some of this work.

When counter workers do not have in stock the specific part a customer wants, they may use measuring devices, such as micrometers.
or calipers, to see if a part that is in stock would fit the customer's needs. Sometimes customers are not sure what is wrong with their car or which parts need to be replaced. On these occasions, counter workers may use coil condenser testers, spark plug testers, and other equipment to identify defective parts. In some firms, particularly small wholesale stores, counter workers repair parts. For example, instead of replacing brakes they may repair them using equipment such as brake riveting machines and brake drum lathes.

Places of Employment

About 75,000 persons worked as automobile parts counter workers in 1976. Automobile dealers and parts wholesalers employed most of them. Dealers typically employed one to four counter workers; many wholesalers employed more than four. Other employers include truck dealers, retail automobile parts stores, and warehouse distributors of automotive parts. Trucking companies and businesses employ counter workers to maintain their stockrooms and dispense parts to mechanics who repair their fleets; however, these workers usually do not sell parts to customers.

Because dealerships and automobile parts stores are located throughout the country, parts counter workers are employed in almost every town and city. Those who work for warehouse distributors, trucking companies, and businesses are employed mainly in large cities.

Training, Other Qualifications and Advancement

Most parts counter workers learn the trade on the job. Beginners usually start as parts deliverers or trainees. In some large firms, beginners work as stock or receiving clerks. (See statements on stock clerks and receiving clerks elsewhere in the Handbook.) By filling out order forms and restocking shelves, trainees gradually familiarize themselves with the different types of parts, the use of catalogs and price lists, and the layout of the stockroom. Although trainees may wait on customers after a few months' experience, it generally takes about 2 years for a counter worker to become capable of handling every aspect of the job.

Automobile parts counter workers should have a good knowledge of how motor vehicles work and the functions of vehicle parts. The ability to work with numbers also is important. Employers generally prefer high school graduates for entry jobs. Courses in automobile mechanics, commercial arithmetic, merchandising, selling, and bookkeeping are helpful to young persons interested in becoming parts counter workers. Practical experience from working in a gasoline service station or automobile repair shop, or working on cars as a hobby also is helpful.

Since they deal with the public in many cases, persons considering careers as automobile parts counter workers should be neat, friendly, and tactful. A good memory and the ability to write legibly and concentrate on details also are important.

Counter workers with supervisory and business management ability may become parts department managers or store managers. Others who are especially good at dealing with people may become outside sales representatives for parts wholesalers and distributor. These people sell parts to automobile repair shops, service stations, trucking companies, and other businesses that buy parts and accessories in large quantities. Some counter workers open their own automobile parts stores.

Employment Outlook

Employment of automobile parts counter workers is expected to increase faster than the average for all occupations. The number of vehicles in use will increase as population grows and incomes rise, allowing people to own more than one vehicle. Changes in styling and engineering of new cars and trucks will create more demand for new accessories and replacement parts. Also, as cars become more expensive, people may attempt to keep their cars longer, and create additional demand for replacement parts.
Besides job growth, many openings are expected to be created annually because of the need to replace experienced workers who retire, die, or transfer to other occupations. The number of openings due to growth is not expected to fluctuate significantly from year to year because the demand for automobile parts, unlike some products, is not very sensitive to changing economic conditions.

Earnings and Working Conditions

Automobile parts counter workers are paid a weekly or monthly salary, or an hourly wage rate. In addition, they may receive commissions on sales. Counter workers employed by automobile dealers in 36 large cities had estimated average earnings of $5.08 an hour in 1976, slightly higher than the average for all nonsupervisory workers in private industry, except farming.

Parts counter workers typically work 40 to 48 hours a week. Because many customers find it convenient to shop on weekends, many counter workers work half a day on Saturday.

Stockrooms usually are clean and well lighted. The work is not physically strenuous, but counter workers spend much time standing or walking. They have to work rapidly, and often must wait on customers and answer telephone calls at the same time.

Many parts counter workers are members of the following unions: the International Association of Machinists and Aerospace Workers; the Sheet Metal Workers' International Association; and the International Brotherhood of Teamsters, Chauf feurs, Warehousemen and Helpers of America (Ind.).

Sources of Additional Information

Details about employment opportunities may be obtained from local automobile dealers and parts wholesalers, locals of the unions previously mentioned, or the local office of the State employment service.

For general information about the occupation, write to:


National Automotive Parts Association, 10400 West Higgins Rd., Rosemont, Ill. 60018.

AUTOMOBILE SERVICE ADVISORS

(D.O.T. 620.281)

Nature of the Work

Service advisors are the link between customers and mechanics in many automobile dealerships and in some large independent garages. When customers bring their cars into the service department, service advisors (sometimes called service sales workers or service writers) find out what needs to be done and arrange for mechanics to do the work.

For routine maintenance, service advisors merely make out a repair order listing the work that the customer wants done. The order includes the customer's name and address, and make and year of the car. If a factory warranty covers the repairs, the advisor also records the engine and body numbers, mileage, and date of purchase.

There are many times, however, when customers complain of problems that could have a variety of causes. In such cases, service advisors attempt to find out as much as possible about the problem. For example, if a customer says the car is hard to start, the advisor would ask if this happens when the engine is cold or after it warms up. Or, if the complaint is a strange noise, the advisor may look the car over, or test drive the car.

After writing the repair order, service advisors tell the customer what
repairs are needed, their approximate cost, and how long the work will take. Since this cannot always be done until mechanics have inspected the cars, service advisors may phone the customers later to give them this information and to ask permission to do the work. Sometimes customers are reluctant to authorize expensive repairs even if they are necessary so service advisors may assure them that the work will improve performance and safety, and prevent more serious trouble.

Service advisors give repair orders to the shop dispatcher who figures the cost of the parts and labor needed for each order and assigns work to mechanics. In some shops, however, advisors compute repair costs. Service advisors also are responsible for answering any questions the mechanics may have about a repair order. When the work is finished, service advisors may test drive cars to be sure all problems have been corrected.

When the customer returns for the car, the service advisor answers any questions about the repairs and settles complaints about their cost or quality. If the customers want to return the car to the shop or want the cost of the repairs adjusted, the advisor usually must get permission from the service manager. In some dealerships, the most experienced service advisors substitute for service managers when they are absent.

In addition to advising customers on their service needs, service advisors occasionally assist customers in selecting accessories for their cars. For example, a customer who wants to add an air-conditioner may check with a service advisor to be sure that the one selected will not cause the car's engine to overheat.

Places of Employment

More than 20,000 persons worked as automobile service advisors in 1976. Most worked for large automobile dealers because dealerships with less than 20 employees usually do not employ service advisors. Some worked for large independent automobile repair shops.

Training, Other Qualifications, and Advancement

Service advisors learn on the job under the guidance of experienced service advisors and the service manager. In many service departments, trainees begin by helping the shop dispatcher. They learn how to route work to the shop mechanics, to compute repair costs, and to estimate the time required for different repairs. Beginners usually can gain enough knowledge and experience in 1 to 2 years to handle almost every type of repair, but learning to estimate the cost of automobile body repairs may take a longer time, as body damage is often very difficult to see and identify.

In addition to on-the-job training, some advisors attend formal training programs conducted by automobile manufacturers.

When hiring persons for jobs as service advisor trainees, employers prefer high school graduates who are 21 years of age and who have experience in automobile repair or related activities, such as assignment to the motor pool in the Armed Forces. Often employers fill these jobs by promoting persons who have worked as mechanic trainees or parts counter worker trainees within their own organization. Some firms prefer to hire mechanics who are experienced in all aspects of automobile repair.

Many automobile dealers consider service advisors their most important employees, because they can promote dealership loyalty and thus build repeat business by winning customer confidence.

Therefore, employers look for applicants who are neat, courteous, even-tempered, attentive listeners, and good conversationalists. High school and vocational school courses in automobile mechanics, commercial arithmetic, sales, public speaking, and English are helpful.

Service advisors with supervisory ability may advance to shop supervisors or to service managers. Some open their own automobile repair shops.

Earnings and Working Conditions

Service advisors employed by automobile dealers in 36 large cities had estimated average earnings of $6.45 an hour in late 1976, more than one-third higher than the average for all nonsupervisory workers in private industry, except farming.

Many service advisors are paid a salary plus a commission, that is, a percentage of the cost of repairs or accessories that their customers paid for. Others are paid a straight commission.

Most service advisors work 40 to 48 hours a week. They are busiest in the early morning when most customers bring their cars in for repairs, and in late afternoon when they return to pick them up. During these peak hours, advisors may have to rush to wait on customers. In addition, they occasionally have to deal with angry customers who question or are not satisfied with the repairs made on their cars.

Service advisors spend most of their time standing or walking around the lot and garage in all kinds of weather. But the work is not physically strenuous.

Employment Outlook

Employment in this small occupation is expected to increase about as fast as the average for all occupations through the mid-1980's. Not only will there be more automobiles on the road, but also future technology and design will make cars more complex. As a result, more service advisors will be needed. In addition to the job openings resulting from employment growth, hundreds of openings will arise each year due to the need to replace experienced service advisors who retire, die, or leave the occupation for other reasons. The number of openings is expected to be fairly stable from year to year, because the demand for automobile repairs is not very sensitive to changing economic conditions.

Job openings for service advisors will be concentrated in large automobile dealerships, most of which are located in heavily populated areas. In small towns, many dealers do not have enough repair business to hire service advisors so shop supervisors do the work instead.
Unions that organize service advisors include the International Association of Machinists and Aerospace Workers; the Sheet Metal Workers' International Association; and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America (Ind.).

Sources of Additional Information

Details on employment opportunities may be obtained from local automobile dealers or repair shops; locals of the unions previously mentioned; or the local office of the State employment service.

For general information about the work of automobile service advisors, write to:

Automotive Service Councils, Inc., 188 Industrial Dr. Suite 112, Elmhurst Ill. 60126

BOAT-ENGINE MECHANICS

(D.O.T. 623.281 and 625.281)

Nature of the Work

Boat engines have many things in common with automobile engines, including unannounced breakdowns. A reliable engine is particularly essential in boating. Breakdowns far from shore can leave a boater stranded for hours—a frustrating and potentially dangerous predicament if the weather turns bad.

To minimize the possibility of breakdowns, engine manufacturers recommend periodic inspections of engines by qualified mechanics to have engines examined and repaired and worn or defective parts replaced. Also, at periodic intervals the mechanic may replace ignition points, adjust valves, and clean the carburetor. After completing these tasks, the engine will be run to check for other needed adjustments. Routine maintenance jobs normally make up most of the mechanic's workload.

When breakdowns occur, mechanics diagnose the cause and repair faulty parts. A quick and accurate diagnosis—one of the mechanic's most valuable skills—requires problem-solving ability as well as a thorough knowledge of the engine's operation. Some jobs require only the replacement of a single item, such as a fuel pump, and may be completed in less than an hour. In contrast, tearing down and reassembling an engine to replace worn valves, bearings, or piston rings may take a day or more.

Mechanics may specialize in either outboard or inboard engines, although many repair both. Most small boats have portable gasoline-fueled outboard engines. Larger craft such as cabin cruisers and commercial fishing boats are powered by inboard engines (located inside the boat) and are similar to automobile engines. Some inboards burn diesel fuel rather than gasoline.

In large shops, mechanics usually work only on engines and other running gear. In small shops they may paint and repair hulls and repair steering mechanisms, lights, and other boat equipment, such as refrigerators, two-way radios, and depth finders. In addition, they may repair engine cycles, mini-bikes, snowmobiles, lawnmowers, and other machines which have small gasoline engines that are similar to outboard engines.

Mechanics use common handtools such as screwdrivers and wrenches; power and machine tools, including drills and grinders; and hoists to lift engines and boats. Engine analyzers, compression gauges, and other testing devices help mechanics locate faulty parts. Mechanics refer to service manuals for assistance in assembling and repairing engines.

Places of Employment

Most of the 15,000 full-time boat-engine mechanics employed in 1976 worked in the shops of boat dealers and marinas. The next largest area of employment was in boat manufacturing plants where mechanics are employed to make final adjustments and repairs at the end of assembly lines. A small number of mechanics worked for boat rental firms. Marinas operated by Federal, State, and local governments also employed mechanics.

- Dealer and marina shops typically employ one to three mechanics; few employ more than 10. Some small
Boating activity increases sharply as the weather grows warmer. Consequently, many mechanics work more than 40 hours a week in spring and summer. During the peak season, some mechanics may work 7 days a week. However, in the winter, they may work less than 40 hours a week, a relatively small number are layed off. In Northern States, some of the winter slack is taken up by repair work on snowmobiles.

The work is not hazardous, but mechanics sometimes suffer cuts, bruises, and other minor injuries. Shop working conditions vary from clean and spacious to dingy and cramped. All shops are noisy when engines are being tested. Mechanics occasionally must work in awkward positions to adjust or replace parts. For many mechanics, however, these disadvantages are more than compensated for by the variety of assignments and the satisfaction that comes from solving problems. Moreover, mechanics may enjoy working near water recreation areas.

**Sources of Additional Information**

Talk about training or opportunities contact local boat dealers and marinas or local State employment offices.

**Diesel Mechanics**

**Nature of the Work.**

Diesel engines are strong and much longer than gasoline engines. In addition, they use fuel more efficiently than gasoline engines because the higher compression ratios found in diesel engines convert a
higher percentage of the fuel into power. Because of their greater durability and efficiency, diesel engines are used to power most of the Nation's heavy vehicles and equipment.

Diesel mechanics repair and maintain diesel engines that power transportation equipment, such as heavy trucks, buses, boats, and locomotives; and construction equipment, such as bulldozers and cranes. They also service diesel farm tractors and a variety of other diesel-powered equipment, such as compressors and pumps used in oil well drilling and irrigation.

Before making repairs, diesel mechanics may use devices such as dynamos to inspect and test engine components to determine why an engine is not operating properly. After locating the trouble, they repair or replace defective parts and make adjustments. Preventive maintenance—avoiding trouble before it starts—is another major responsibility. For example, they may periodically inspect, test, and adjust engine parts such as fan belts and fuel filters.

Many mechanics make all types of diesel engine repairs. Others specialize, in rebuilding engines, for example, or in repairing fuel injection systems, turbochargers, cylinder heads, or starting systems. Some also repair large natural gas engines used to power generators and other industrial equipment. In addition to maintaining and repairing engines, diesel mechanics may work on other parts of diesel-powered equipment, such as brakes and transmissions.

Most workers who maintain and repair diesel engines are not called diesel mechanics. Instead, their job titles usually indicate the type of diesel equipment they repair. For example, workers who maintain and repair diesel trucks or buses are called truck or bus mechanics, and those who work on diesel farm tractors are called farm equipment mechanics.

Many of these occupations are discussed elsewhere in the Handbook. (See statements on truck mechanics, bus mechanics, automobile mechanics, and farm equipment mechanics.)

Diesel mechanics use pliers, wrenches, screwdrivers, and other common handtools as well as special tools, such as valve refacers and piston pin fitting machines. In addition, they may use complex testing equipment, such as a dynamometer to measure engine power, and special fuel injection testing equipment. Mechanics also may use machine tools to make replacement parts. They use powered hoists and other equipment for lifting and moving heavy parts.

**Places of Employment**

About 100,000 persons worked as diesel mechanics in 1976. Many worked for distributors and dealers that sell diesel engines, farm and construction equipment, and trucks. Others were employed by buslines, construction firms, and government agencies such as State highway departments. Some mechanics worked for diesel engine manufacturers and independent repair shops that specialize in diesels.

Because diesel engines are used throughout the country, diesel mechanics are employed in almost every town and city. However, those who work for trucking companies and buslines are employed mainly in large cities.

**Training, Other Qualifications, and Advancement**

Diesel mechanics learn their skills in several different ways. Many begin by repairing gasoline-powered automobiles, trucks, and buses. They usually start as helpers to experienced gasoline engine mechanics, becoming skilled in all types of repairs in 3 or 4 years. If the garage or business they work for uses or repairs diesel equipment, they receive several months of additional training in servicing this equipment. While learning to fix engines on the job, many find it helpful to take courses in diesel equipment maintenance offered by vocational, trade, and correspondence schools.

A few mechanics learn their trade through formal apprenticeship programs. These programs, which generally last 4 years, give trainees a combination of classroom training and practical experience. The classroom instruction usually covers blueprint reading, hydraulics, welding, and other subjects related to diesel repair.

Still another method of entry is through full-time attendance at trade or technical schools that offer train-
ing in diesel engine maintenance and repair. These programs generally last from several months to 2 years and provide classroom instruction and often practical experience. Graduates, however, usually need additional on-the-job training before they are capable of handling all types of diesel repair.

Experienced mechanics employed by companies that sell diesel-powered equipment sometimes are sent to special training classes conducted by engine-manufacturers. In these classes, mechanics learn to maintain and repair the latest engines, using the most modern equipment. In addition, they may receive training in specialties such as engine rebuilding.

Employers prefer trainees and apprenticeship applicants who have a high school or vocational school education and mechanical ability. Shop courses in blueprint reading, automobile repair, and machine shop work are helpful, as are courses in science and mathematics. Because the work often requires lifting heavy parts, persons interested in becoming diesel mechanics should be in good physical condition.

Many diesel mechanics have to buy their own handtools and beginners are expected to accumulate tools as they gain experience. Experienced mechanics usually have several hundred dollars invested in their tools.

Mechanics who work for organizations that operate or repair large numbers of diesel engines, such as buslines or diesel equipment distributors, may advance to a supervisory position, such as shop supervisor or service manager.

**Employment Outlook**

Employment of diesel mechanics is expected to increase faster than the average for all occupations through the mid-1980's. In addition to the jobs arising from employment growth, many openings will result from the need to replace experienced mechanics who transfer to other occupations, retire, or die.

Increased employment of mechanics is expected mainly because most industries that use diesel engines are expected to expand their activities in the years ahead. In addition, diesel engines will continue to replace gasoline engines in trucks, buses, and other equipment because properly tuned diesels use less fuel and produce less pollution.

Most new job openings in this field will be filled by mechanics who have experience in repairing gasoline engines. Companies that replace gasoline engine equipment with diesel-powered equipment usually retain their experienced mechanics. Persons who have school training in diesel repair, but no practical experience, may be able to find jobs only as trainees.

**Earnings and Working Conditions**

According to a 1975-76 wage survey covering 36 metropolitan areas, mechanics employed by trucking companies, busines, and other firms that maintain their own vehicles earned an average hourly wage of $6.67, more than one-third above the average for all nonsupervisory workers in private industry, except farming.

Diesel mechanics usually work 40 to 48 hours a week. Many work at night or on weekends, particularly if they work on buses, engines used in powerplants, or other diesel equipment used in serving the public. Some are subject to call for emergencies at any time. Mechanics generally receive a higher rate of pay when they work overtime, evenings, or weekends.

Most larger repair shops are pleasant places in which to work, but some small shops have poor lighting, heating, and ventilation. Diesel mechanics sometimes make repairs outdoors where breakdowns occur. If proper safety precautions are not taken, there is danger of injury when repairing heavy parts supported on jacks or hoists. In most jobs, mechanics handle greasy tools and engine parts. When making repairs, they sometimes must stand or lie in awkward positions.

Many diesel mechanics belong to labor unions, such as the International Association of Machinists and Aerospace Workers; the Amalgamated Transit Union; the Sheet Metal Workers' International Association; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; and the International Brotherhood of Electrical Workers.

**Sources of Additional Information**

Information about work opportunities in this trade may be available from the local office of the State employment service. Other sources of information are firms that use service diesel-powered equipment, such as truck and buslines, truck dealers, and construction and farm equipment dealers. Additional information on careers is available from:


**FARM EQUIPMENT MECHANICS**

(D.O.T. 624.281 and .381)

**Nature of the Work**

Years ago farmers planted, cultivated, and harvested their crops using only handtools and simple animal-drawn equipment. Few repairs were required and if a stray rock or stump broke a plow blade, the metal pieces could be hammered back together by the local blacksmith. Even when tractors began to replace animals as the prime source of power, their simplicity made it possible for most farmers to do their own repair work.

But in the last quarter century farm equipment has grown enormously in size and variety. Many farms have both diesel and gasoline tractors, some equipped with 300-horsepower engines. Other machinery, such as harvesting combines, hay balers, corn pickers, crop dryers, and elevators, also is common. In today's world of mechanized agriculture, few if any types of farming can be done economically without specialized machines.
As farm machinery grew more complex, it became important for the sellers of farm equipment to be able to service and repair the machines they sold. Almost every dealer employs farm equipment mechanics to do this work and to maintain and repair the smaller lawn and garden tractors dealers sell to suburban homeowners.

In addition, some mechanics assemble new implements and machinery for farm equipment dealers and wholesalers, and occasionally they must repair dented or torn sheet metal on the bodies of tractors or other machinery.

Mechanics spend much of their time repairing and adjusting malfunctioning diesel- and gas-powered tractors that have been brought to the shop. During planting or harvesting seasons, however, the mechanic may travel to the farm to make emergency repairs so that crops can be harvested before they spoil.

Mechanics also perform preventive maintenance. Periodically, they test, adjust, and clean parts and tune engines. In large shops, mechanics may specialize in certain types of work, such as engine overhaul or clutch and transmission repair. Others specialize in repairing the air conditioning units often included in the cabs of modern tractors and combines, or in repairing certain types of equipment such as hay balers. Some mechanics also repair plumbing, electrical, irrigation, and other equipment on farms.

Mechanics use many simple handtools including wrenches, pliers, hammers, and micrometers. They also may use more complex testing equipment, such as a dynamometer to measure engine performance, or a compression tester to find worn piston rings or leaking cylinder valves. They may use welding equipment or power tools to repair broken parts.

**Places of Employment**

Most of the estimated 66,000 farm equipment mechanics employed in 1976 worked in service departments of farm equipment dealers. Others worked in independent repair shops, in shops on large farms, and in service departments of farm equipment wholesalers and manufacturers. Most farm equipment repair shops employ fewer than five mechanics, although a few dealerships employ more than 10. A small proportion of farm equipment mechanics are self-employed.

Because some type of farming is done in nearly every area of the United States, farm equipment mechanics are employed throughout the country. As employment is concentrated in small cities and towns, this may be an attractive career choice for people who do not wish to live the fast-paced life of an urban environment. However, many mechanics work in the rural fringes of metropolitan areas, so farm equipment mechanics who prefer city life need not live in rural areas.

**Training, Other Qualifications, and Advancement**

Most farm equipment mechanics are hired as helpers and learn the trade on the job by assisting qualified mechanics. The length of training varies with the helper's aptitude and prior experience. At least 2 years of on-the-job training usually are necessary before a mechanic can do most types of repair work, and additional training and experience are required for highly specialized repair and overhaul jobs.

Many farm equipment mechanics enter this occupation from a related occupation. For instance, they may gain experience as farmers and farm laborers, or as heavy equipment mechanics, auto mechanics, or air-conditioning mechanics. People who enter from related occupations also start as helpers, but they may not require as long a period of on-the-job training.

More and more mechanics who enter the trade have had vocational training in rural high schools, in junior and technical colleges, or in the Armed Forces. With the development of more complex farm implements, technical training in electronics has become more important.

A few farm equipment mechanics learn the trade by completing an apprenticeship program, which lasts from 3 to 4 years and includes on-the-job as well as classroom training in all phases of farm equipment repair and maintenance. Applicants for these programs usually are chosen from shop helpers.

Some farm equipment mechanics and trainees receive refresher training in short-term programs conduct-
ed by farm equipment manufacturers. These programs usually last several days. A company service representative explains the design and function of equipment and teaches maintenance and repair on new models of farm equipment. In addition, some dealers may give employees time off to attend local vocational schools that teach special weekend classes in subjects such as air-conditioning repair or hydraulics.

Employers prefer applicants who have an aptitude for mechanical work. A farm background is an advantage since growing up on a farm usually provides experience in basic farm equipment repairs. Employers also prefer high school graduates, but some will hire applicants who have less education. In general, employers stress previous experience or training in diesel and gasoline engines, the maintenance and repair of hydraulics, and welding subjects that may be learned in many high schools and vocational schools. Some employers also may require mechanics to be skilled at blueprint reading because mechanics may have to refer to the diagrams of machinery when making complex repairs to electrical and other systems.

Persons considering entering the field should have the manual dexterity needed to handle tools and equipment. Occasional strength is required to lift more than 40 pounds. Mechanics require problem-solving abilities and an experienced mechanic should be able to work independently with minimum supervision.

Farm equipment mechanics usually advance to shop supervision or manager of a farm equipment dealership. Some mechanics open their own repair shops. A few farm equipment mechanics earn a 2 year associate degree in agricultural mechanics and advance to service representatives for farm equipment manufacturers.

Employment Outlook

Employment of farm equipment mechanics is expected to increase about as fast as the average for all occupations through the mid 1980's. In addition to jobs from employment growth, several hundred job opportunities will arise each year as experienced mechanics retire, die, or transfer to other occupations. Opportunities will best be for applicants who have lived on farms and know how to operate farm machinery and make minor repairs.

The development of more technologically advanced farm equipment, some of which will require greater maintenance, will increase the demand for mechanics. For instance, many newer tractors have larger engines, and feature advanced transmissions of up to 24 speeds. More complex electrical systems also are used to operate the great variety of gauges and warning devices now used to alert the operator to problems such as brake wear, low oil pressure in the transmission, or insufficient coolant in the radiator. Advantages such as these and air-conditioned cabs, which have improved the comfort of the operator, have made it more difficult for farmers to do their own repairs. Thus farmers will have to rely more on skilled mechanics in the future.

In addition, the larger and more complex farm machinery sales of smaller town and garden equipment have increased vastly over the past decade and are expected to continue to do so. Most of the large manufacturers of farm equipment now produce a line of these smaller tractors and sell them through their established dealership. Most mechanics will be needed to service this additional equipment.

Mechanics often travel many miles to repair equipment in the field, and are exposed to all kinds of weather. They come in contact with grease, gasoline, rust, and dirt, and there is danger of injury when they repair heavy parts supported on jacks or by hoists. Engine burns and cuts from sharp edges of machinery also are possible.

Very few farm equipment mechanics belong to labor unions, but those who do are members of the International Association of Machinists and Aerospace Workers.

Sources of Additional Information

Details about work opportunities may be obtained from local farm equipment dealers and local offices of the State employment service. For general information about the occupation, write to:

National Farm and Power Equipment Dealers Association, 10877 Watson Road, St. Louis, Mo 63127.

GASOLINE SERVICE STATION ATTENDANTS

Gasoline service station attendants operate various service and repair equipment, such as oil pumps and vacuum gauges, to repair and refuel vehicles. The pumps are driven into gasoline service stations for fuel and service. Most need only a few gallons of gas and a clean windshield, but service station attendants check for other things as well to help owners keep their cars in good condition.

Unless a driver is in a hurry, attendants usually check the oil level in the crankcase and the water levels in the battery and radiator. If the customer asks, they will also check the air pressure in the tires and examine fan belts, hoses, and other parts for signs of excessive wear that could cause problems for the driver.

Besides offering these basic services, many stations also do repair work
and other replaceable parts, often needing items such as batteries, headlight bulbs, and windshield wiper blades. Attendants also sell and install these parts and in some cases may do much repair work, such as changing oil, rotating tires, and fixing leaks. Most of these tasks can be done using a rollback, a place where the car can be rolled under a pit, and other simple hand tools. Some attendants called mechanics after they perform more difficult repairs and use more complex equipment in feeding motor analyzers and school alignment machines.

When customers arrive, the attendant collects payments and may change or prepare change slips.

Attendants also may do some simple mechanical work, such as changing oil, rotating tires, and fixing leaks. They help the station manager take inventory of automobile parts in stock, set up displays, and keep business records.

If necessary, stations have a road service attendant who drives a truck to the site and makes repairs, a bit to replace the battery, and change a flat tire or perform other minor repairs. If they cannot fix the car on the spot, they send it back to the station.

Service station attendants work in the station's repair shop. They are called mechanics and work closely with the station manager. They perform minor repairs and maintain the station's equipment.

Although completion of high school is not generally a requirement for an entry job, although there are some formal training programs. Trainees get relatively simple work at first, such as cleaning the station, pumping gas, and cleaning windows. Gradually, they progress to more advanced work such as performing preventive maintenance, installing accessories on cars, and helping keep the station records. It usually takes from several months to a year for a beginner to become familiar with all the tasks.

Service station attendants receive most of their training on the job, although there are some formal training programs. Trainees receive formal training programs that usually take several months to a year for a beginner to become familiar with all the tasks.

Some attendants are enrolled in automobile vocational training programs, which are conducted by most major oil companies. These programs usually last from 2 to 8 weeks and emphasize subjects such as automobile maintenance, marketing, and business management.

Several avenues of advancement are open to service station attendants. Additional training qualifies them for some jobs, such as mechanic, tool setter, or radio repairman. They should also be familiar with local roads, highways, and points of interest in order to give directions to customers and locate cars whose owners have called for road service.

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for themselves by leasing a station
from an oil company or buying their
own station. Oil companies hire some
service station managers as sales rep-
resentatives or district managers.

Employment Outlook

Employment of gasoline service
station attendants should continue to
grow over the next few years. But
whether this trend will continue
through the mid-1980's is difficult to
judge. Increased sales of cars that
offer better gas mileage could eventu-
ally reduce total gasoline consump-
tion, which might severely limit
growth in this occupation over the
long run. Self-service gas stations
also may limit growth. However, in
this relatively large occupation, thou-
sands of job openings are expected
each year to replace workers who
tire or die. Turnover also is high, so
thousands more openings will arise
each year as attendants transfer to
other occupations.

Earnings and Working
Conditions

Earnings of gasoline service
attendants vary considerably. Hourly
earnings for many attendants ranged
from $2.30 to $4 in 1976 according
to the limited information available.
In addition, many attendants are paid
a commission based on the value of the
products they sell. Attendents
employed in large metropolitan areas
generally had higher earnings than
those in small towns.

Full-time attendants work 40
hours a week or more because gas
stations usually are open at least 12
hours a day, 6 days a week. Work
schedules may include evenings,
weekends, and holidays.

Attendants work outdoors in all
kinds of weather. They do consider-
able lifting and stooping and spend
much time on their feet. Possible in-
juries include cuts from sharp tools
and burns from hot engines.

For many attendants, however, the
opportunity to deal with people to
work on cars, and possibly to manage
their own service stations someday
more than offsets these disadvantag-
es. Also, the opportunity to get part-
time employment makes the job at-
tractive to many people. Some col-
lege students have been able to work
their way through school as service
station attendants and many who
hold other jobs add to their income
by working part time as attendants.

Sources of Additional
Information

For more details about work oppor-
tunities, contact local gasoline
service stations or the local office of
the State employment service.

MOTORCYCLE
MECHANICS

Nature of the Work

There were just over 30,000
motorcycles in the United
States. Today there are over 6 mil-
lion. Accompanying this rapid rise in
the number of motorcycles has been
a rapid increase in the number of
motorcycle mechanics. For although
many cycling enthusiasts repair their
own vehicles, most rely on skilled
mechanics.

Motorcycles, like automobiles,
need periodic servicing to operate at
peak efficiency. Spark plugs, igni-
tion points, brakes, and many other
parts frequently require adjustment
or replacement. This routine servic-
ing represents the major part of the
mechanic's work.

The mark of a skilled mechanic is
the ability to diagnose mechanical
and electrical problems and to make
repairs in a minimum of time. In
diagnosing problems, the mechanic
first obtains a description of the
symptoms from the owner, and then
runs the engine or test rides the mo-
torcycle. The mechanic may have to
use special testing equipment and
disassemble some components for
further examination. After pinpoint-
ing the problem, the mechanic makes
needed adjustments or replacements.
Some jobs require only the replace-
ment of a single item, such as a car-
buretor or generator, and may be
completed in less than an hour. In
contrast, an overhaul may require
several hours, because the mechanic
must disassemble and reassemble the
engine to replace worn valves, pis-
tons, bearings, and other internal
parts.

Mechanics use common handtools
such as wrenches, pliers, and screw-
drivers, as well as special tools for
getting at parts that are hard to re-
move such as flywheels and bearings.
They also use compression gauges,
timing lights, and other kinds of test-
ing devices. Hoists are used to lift
heavy motorcycles.
Most mechanics specialize in servicing only a few of the more than 30 brands of motorcycles and motor scooters. In large shops, some mechanics specialize in overhauling and rebuilding engines and transmissions, but most are expected to perform all kinds of repairs. Mechanics may occasionally repair mini-bikes, go-carts, snowmobiles, outboard motors, lawn mowers, and other equipment powered by small gasoline engines.

**Places of Employment**

About 12,000 persons had full time jobs as motorcycle mechanics in 1976, and a few thousand more had part-time jobs. Most mechanics work for motorcycle dealers. Others work for city governments to maintain police motorcycles. A small number of mechanics work for firms that specialize in modifying or "customizing" motorcycles. Most shops employ fewer than five mechanics.

Motorcycle mechanics work in every State and major city. About half work in nine States: California, Michigan, Texas, Ohio, Pennsylvania, Illinois, Florida, Minnesota, and Indiana.

Motorcycle dealerships are the largest employers of motorcycle mechanics. Their customers range from Sunday riders to racing enthusiasts, and mechanics are often called on to provide special modifications for competitive racing. Many dealers employ mechanics who specialize in repairing motorcycles. Mechanics who work in metropolitan areas may repair motorcycles on a customer basis, whereas mechanics employed by dealerships work under the supervision of the service manager. Mechanics in small dealerships usually work under the supervision of the owner or a supervisor.

Mechanics who specialize in repairing motorcycles work mainly in metropolitan areas, whereas mechanics who work in smaller cities or rural areas frequently repair both motorcycles and automobiles. Mechanics who work for wholesalers and distributors may repair a variety of vehicles, including motorcycles, snowmobiles, and outboard motors. Motorcycle mechanics may also work for motor vehicle dealers who specialize in sales and service of motorcycles and other small engines.

**Training, Other Qualifications and Advancement**

Motorcycle mechanics usually learn their trade on the job or by picking up skills from experienced workers. Beginners usually start by learning to assume and road test new motorcycles. Next they learn routine maintenance jobs such as adjusting brakes and replacing spark plugs and ignition points. As trainees gain experience, they progress to more difficult tasks such as repairing electrical systems and overhauling engines and transmissions. Generally, 2 to 3 years of training on the job are necessary before trainees become skilled in all aspects of motorcycle repair.

Trainees usually accumulate hands-on experience as they gain experience. Experienced mechanics often have several hundred dollars invested in tools.

Employers sometimes send mechanics and experienced trainees to special training courses conducted by motorcycle manufacturers and importers. These courses, which can last as long as 2 weeks, are designed to upgrade the worker's skills and provide information on repairing new models.

When hiring trainees, employers look particularly for cycling enthusiasts who have gained practical experience by repairing their own motorcycles. However, many employers will hire trainees with no riding experience if they have mechanical aptitude and show interest in learning the trade. Trainees must be able to obtain a motorcycle driver's license so they can deliver newly assembled motorcycles and test drive those brought in for repairs.

Most employers prefer high school graduates but will accept applicants with less education. Courses in small engine repair offered by some high schools and vocational schools generally are helpful, as are courses in automobile mechanics and electrical work. Many motorcycle dealers employ students to help assemble new motorcycles and perform minor repairs.

Public schools in some large cities offer postsecondary and adult education in small engine and motorcycle repair. Some technical schools have training programs for motorcycle mechanics. Many junior and community colleges offer courses in motorcycle repair.

Because all internal combustion engines are similar, skills learned through repairing motorcycles can be transferred to other fields of mechanical work. For example, motorcycle mechanics can become automobile, truck, or diesel mechanics after some additional training. However, transferring to one of these occupations would not necessarily mean higher earnings.

Motorcycle mechanics have limited advancement possibilities. Those with supervisory ability may advance to service manager and, eventually, to general manager in large dealerships. Those who have the necessary capital may become dealers.

**Employment Outlook**

Employment in this relatively small occupation is expected to grow faster than the average for all occupations through the mid-1980's. Openings arising from growth will fluctuate from year to year, however, as motorcycle sales and thus employment of motorcycle mechanics appear to be sensitive to dips in the business cycle. Additional openings will arise from the need to replace experienced mechanics who retire, die, or transfer to other fields of work.

Underlying the anticipated growth in the number of motorcycle mechanics is the continued growth in the number of motorcycles. Increases in the young adult population and in personal income levels will create a demand for more motorcycles, and additional mechanics will be needed to maintain these machines. Also, growth in the numbers of minibikes and snowmobiles will stimulate the demand for mechanics.

Opportunities for employment will be best in larger dealerships, most of which are located in the suburbs of metropolitan areas. Many motorcycle dealers in small cities do not have enough business to hire full-time trainees, but part-time or summer jobs may be available.

**Earnings and Working Conditions**

Earnings for motorcycle mechanics and trainees vary widely and depend on level of skill, geographic location, season of the year, and employer. Limited information indicates that experienced mechanics employed by motorcycle dealers earned between $4 and $10 an hour in late 1976. Generally, experienced mechanics earned 2 to 3 times as much as trainees.

Some mechanics receive a hourly rate or a weekly salary. Others re-
Some truck and bus mechanics specialize in the repair of diesel engines.
mechanic may be assisted by an apprentice or helper. Mechanics generally get their assignments from shop supervisors or service managers who may check the mechanics work or assist in diagnosing problems.

Places of Employment

A large proportion of the estimated 125,000 truck mechanics employed in 1976 worked for firms that owned fleets of trucks. Fleet owners include trucking companies and businesses that haul their own products such as dairies and bakeries. Other employers include truck dealers, truck manufacturers, truck repair shops, firms that rent or lease trucks, and Federal, State, and local governments.

Most of the estimated 20,000 bus mechanics employed in 1976 worked for local transit companies and intercity busines. Bus manufacturers employed a relatively small number of mechanics.

Truck and bus mechanics are employed in every section of the country, but most work in large towns and cities where trucking companies, busines, and other fleet owners have large repair shops.

Training, Other Qualifications, and Advancement

Most truck or bus mechanics gain their skills on the job. Beginners usually do tasks such as cleaning parts, fueling, and lubrication. They may also drive vehicles in and out of the shop. As beginners gain experience and as vacancies become available, they usually are promoted to mechanics' helpers. In some shops beginners, especially those having prior automobile repair experience, start as mechanics' helpers.

Most helpers can make minor repairs after a few months' experience and advance to increasingly difficult jobs as they prove their ability. Generally, 3 to 4 years of on-the-job experience are necessary to qualify as an all-round truck or bus mechanic. Additional training may be necessary for mechanics who wish to specialize in diesel engines.

Most training authorities recommend a formal 4-year apprenticeship as the best way to learn these trades. Typical apprenticeship programs for truck and bus mechanics consist of approximately 8,000 hours of shop training in which trainees obtain practical experience working on transmissions, engines, and other components and at least 576 hours of classroom instruction in which trainees learn blueprint reading, mathematics, engine theory and safety. Frequently, these include training in both diesel and gasoline engine repair.

For entry jobs, employers generally look for applicants who have mechanical aptitude, are at least 18 years of age, and in good physical condition. Completion of high school is an advantage in getting an entry mechanic job because most employers believe it indicates that a person has at least some of the traits of a good worker, such as reliability and perseverance. Employers do not want to spend a lot of time and money training mechanics only to see them quit.

When the mechanic's duties include driving trucks or buses on public roads, applicants may need a State chauffeur's license if the employer is engaged in interstate transportation. Applicants also may have to meet qualifications for drivers established by the U.S. Department of Transportation. These applicants must be at least 21 years of age, in good physical condition, and have good hearing and 20/40 eyesight with or without glasses. They must read and speak English and have a good driving record, including 1 year's driving experience.

Persons interested in becoming truck or bus mechanics can gain valuable experience by taking high school or vocational school courses in automobile and diesel repair. Science and mathematics are helpful since they better one's understanding of how trucks and buses operate. Practical experience in automobile repair from working in a gasoline service station, the Armed Forces, or as a hobby also is valuable.

Most mechanics must buy their own handtools. Experienced mechanics often invest several hundred dollars in tools.

Employers sometimes send experienced mechanics to special training classes conducted by truck, bus, diesel engine, and parts manufacturers. In these classes, mechanics learn to repair the latest equipment or receive special training in subjects such as diagnosing engine malfunctions. Mechanics also may read service and repair manuals to keep abreast of engineering changes.

Experienced mechanics who have leadership ability may advance to shop supervisors or service managers. Truck mechanics who have sales ability sometimes become truck sales representatives. Some mechanics open their own gasoline service stations or repair shops.

Employment Outlook

Employment of truck mechanics is expected to increase about the same as the average for all occupations through the mid-1980's as a result of significant increases in the transportation of freight by trucks. More trucks will be needed for both local and intercity hauling due to the increased production of goods and the necessity of transporting them greater distances and to more places as both population and industrial centers spread out. In addition to the jobs created by employment growth, many openings will arise to replace truck mechanics who retire, die, or transfer to other occupations.

Bus mechanic employment is expected to increase slower than the average for all occupations through the mid-1980's because of offsetting factors affecting the demand for bus service. More buses will be needed for local travel due to increased emphasis on mass transit systems. Intercity bus travel, on the other hand, is expected to remain about the same. Most job openings will result from the need to replace bus mechanics who retire, die, or transfer to other occupations.

Earnings and Working Conditions

Truck and bus mechanics employed by trucking companies, busines, and other firms that maintain their own vehicles had estimated

Beginning apprentices usually earn one-half the rate of skilled workers and receive increases about every 6 months until a rate of 90 percent is reached.

Most mechanics work between 40 and 48 hours per week. Because many truck and bus firms provide service around the clock, mechanics who work for these firms may work evenings, nights, and weekends. When they do, they usually receive a higher rate of pay.

Truck mechanics and bus mechanics are subject to the usual shop hazards such as cuts and bruises. Mechanics handle greasy and dirty parts and may stand or lie in awkward or cramped positions when repairing vehicles. Work areas usually are well lighted, heated, and ventilated, and many employers provide locker rooms and shower facilities. Although most work is done indoors, mechanics occasionally work or make emergency repairs on the road.

Many truck and bus mechanics are members of labor unions, including the International Association of Machinists and Aerospace Workers, the Amalgamated Transit Union, the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the Transport Workers Union of America; the Sheet Metal Workers' International Association, and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America (Ind.)

Sources of Additional Information

More details about work opportunities for truck or bus mechanics may be obtained from local employers such as trucking companies, truck dealers, or bus lines; locals of unions previously mentioned; or the local office of the State employment service. The State employment service also may have information about apprenticeship and other training programs.

For general information about the work of truck mechanics and apprenticeship training, write to:

American Trucking Associations, Inc. 1616 P St NW Washington, D.C. 20036
To make the Occupational Outlook Handbook easier to use, each occupation or industry follows the same outline. Separate sections describe basic elements, such as work on the job, education and training needed, and salaries or wages. Some sections will be more useful if you know how to interpret the information as explained below.

The TRAINING, OTHER QUALIFICATIONS, AND ADVANCEMENT section indicates the preferred way to enter each occupation and alternative ways to obtain training. Read this section carefully because early planning makes many fields easier to enter. Also, the level at which you enter and the speed with which you advance often depend on your training. If you are a student, you may want to consider taking those courses thought useful for the occupations which interest you.

Besides training, you may need a State license or certificate. The training section indicates which occupations generally require these. Check requirements in the State where you plan to work because State regulations vary.

Whether an occupation suits your personality is another important area to explore. For some, you may have to make responsible decisions in a highly competitive atmosphere. For others, you may do only routine tasks under close supervision. To work successfully in a particular job, you may have to do one or more of the following:

- Motivate others
- Direct and supervise
- Work with all types of people
- Work with things you need
- Work alone
- Work in laboratory
- Work outside
- Work as part of a team
- Work with detailed plans
- Do physical work
- Do laboratory work
- Do work outside
- Work with data
- Maintain files
- Maintain equipment
- Do skilled work
- Sit
- Stand
- Walk

To determine which skills you can judge and which you cannot, you may wish to take an EMPI test. If the job market is likely to be favorable, how much growth is expected compared to the average job growth rate for all occupations (20.1 percent between 1970 and 1995)?

The following phrases are used:

- Much faster
- Faster
- About as fast
- Slow
- Little change
- Decline

Earnings information is lacking for most occupations.

There are exceptions, however, especially among professional occupations. Nearly everyone who earns a medical degree, for example, becomes a practicing physician. When the number of people pursuing relevant types of education and training and then entering the field can be compared with the demand, the outlook section indicates the supply/demand relationship as follows:

- Excellent
- Very good
- Good or favorable
- Rough balance
- May face competition
- Likely more than supply
- Likely less than demand
- Supply much greater than demand
- Demand much greater than supply
- Demand greater than supply
- Demand less than supply
- Supply much less than demand
- Demand much less than supply

A few job openings should not stop your pursuit of a career that matches your aptitudes and interests. Even small or overcrowded occupations provide some jobs. So do those in which employment is growing very slowly or declining.

Growth in an occupation is not the only source of job openings because the number of openings from turnover can be substantial in large occupations. In fact, replacement needs are expected to create 70 percent of all openings between 1976 and 1985.

Finally, job prospects in your area may differ from those in your nation as a whole. Your State employment service can furnish local information.

TheEMPLOYMENT section tells what workers are earning in your job. To find out what a job pays, you must ask the right question to answer. To whom your information is available for only one type of earnings—wages and salaries—and not even this for all occupations. Although 9 out of 10 workers receive this form of income, many earn extra money by working overtime, night shifts, or irregular schedules. Some occupations pay tips or commissions based on sales or service. Some factory workers are paid a piece rate; an extra payment for each item they make.

The following phrases indicate the relationship of supply and demand to the number of people pursuing relevant types of education and training:

- Demand much greater than supply
- Demand greater than supply
- Rough balance
- Demand less than supply
- Supply much greater than demand
- Demand much less than supply

Earnings and other benefits such as paid vacations, holidays, and sick leave are important factors in choosing a job. Earnings for self-employed workers may vary widely because much depends on whether one is just starting out or he has an established business.

Most wage and salary workers receive fringe benefits and, in many occupations, such as physicians, dentists, nurses, and farm workers, for example. Earnings for self-employed workers, on the other hand, may require a higher level of income to maintain a comfortable lifestyle. Paid vacations, holidays, and sick leave are important factors in choosing a job. Earnings for self-employed workers may vary widely because much depends on whether one is just starting out or he has an established business.

Most wage and salary workers receive fringe benefits such as paid vacations, holidays, and sick leave. In addition, some may receive discounts on merchandise. Despite difficulties in determining exactly what people earn in a job, the Earnings section does compare occupational earnings by indicating whether a certain job pays more or less than the average for all nonsupervisors in private industry, excluding farming.

Each occupation has many pay levels. Beginners almost always earn less than workers who have been on the job for some time. Earnings also vary by geographic location but cities that offer the highest earnings often are those where living costs are most expensive.
What's an ad for the 0OQ doing in a place like this?

The career information contained in the reprint you are reading was taken from the 1978-79 edition of the Occupational Outlook Handbook. But the Handbook is not the only source of useful career information published by the Bureau of Labor Statistics. The Handbook's companion, the Occupational Outlook Quarterly, is published four times during the school year to keep subscribers up to date on new occupational studies completed between editions of the Handbook. The Quarterly also gives practical information on training and educational opportunities, salary trends, and new and emerging jobs—just what people need to know to plan careers.

If you were a subscriber to recent issues of the Occupational Outlook Quarterly, you could have learned:

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- ways to earn college credit without going to college
- what's happening in the field of career education
- about career possibilities in such fields as journalism, mid-wifery, and shorthand reporting.

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