

Aircraft and Avionics Equipment Mechanics and Service Technicians

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Significant Points

- Most workers learn their jobs in 1 of about 170 schools certified by the Federal Aviation Administration (FAA).
- Job opportunities should be favorable for persons who have completed an aircraft mechanic training program, but keen competition is likely for jobs at major airlines, which offer the best pay and benefits.
- Job opportunities are likely to continue to be best at small commuter and regional airlines, at FAA repair stations, and in general aviation.

Nature of the Work About this section

Today's airplanes are highly complex machines with parts that must function within extreme tolerances for them to operate safely. To keep aircraft in peak operating condition, aircraft and avionics equipment mechanics and service technicians perform scheduled maintenance, make repairs, and complete inspections required by the FAA.

Many aircraft mechanics specialize in preventive maintenance. They inspect aircraft engines, landing gear, instruments, pressurized sections, accessories—brakes, valves, pumps, and air-conditioning systems, for example—and other parts of the aircraft, and do the necessary maintenance and replacement of parts. They also keep records related to the maintenance performed on the aircraft. Mechanics and technicians conduct inspections following a schedule based on the number of hours the aircraft has flown, calendar days since the last inspection, cycles of operation, or a combination of these factors. In large, sophisticated planes equipped with aircraft monitoring systems, mechanics can gather valuable diagnostic information from electronic boxes and consoles that monitor the aircraft's basic operations. In planes of all sorts, aircraft mechanics examine engines by working through specially designed openings while standing on ladders or scaffolds or by using hoists or lifts to remove the entire engine from the craft. After taking an engine apart, mechanics use precision instruments to measure parts for wear and use x-ray and magnetic inspection equipment to check for invisible cracks. They repair or replace worn or defective parts. Mechanics also may repair sheet metal or composite surfaces; measure the tension of control cables; and check for corrosion, distortion, and cracks in the fuselage, wings, and tail. After completing all repairs, they must test the equipment to ensure that it works properly.

Other mechanics specialize in repair work rather than inspection. They find and fix problems that pilots describe. For example, during a preflight check, a pilot may discover that the aircraft's fuel gauge does not work. To solve the problem, mechanics may troubleshoot the electrical system, using electrical test equipment to make sure that no wires are broken or shorted out, and replace any defective electrical or electronic components. Mechanics work as fast as safety permits so that the aircraft can be put back into service quickly.

Some mechanics work on one or many different types of aircraft, such as jets, propeller-driven airplanes, and helicopters. Others specialize in one section of a particular type of aircraft, such as the engine, hydraulics, or electrical system. In small, independent repair shops, mechanics usually inspect and repair many different types of aircraft.

Airframe mechanics are authorized to work on any part of the aircraft except the instruments, power plants, and propellers. Powerplant mechanics are authorized to work on engines and do limited work on propellers. Combination airframe-and-powerplant mechanics—called A&P mechanics—work on all parts of the plane except the instruments. Most mechanics working on civilian aircraft today are A&P mechanics.

Avionics systems—components used for aircraft navigation and radio communications, weather radar systems, and other instruments and computers that control flight, engine, and other primary functions—are now an integral part of aircraft design and have vastly increased aircraft capability. Avionics technicians repair and maintain these systems. Because of the

increasing use of technology, more time is spent repairing electronic systems, such as computerized controls. Technicians also may be required to analyze and develop solutions to complex electronic problems.

Work environment. Mechanics work in hangars, repair stations, or out on the airfield on the "flight lines" where aircraft park. Mechanics often work under time pressure to maintain flight schedules or, in general aviation, to keep from inconveniencing customers. At the same time, mechanics have a tremendous responsibility to maintain safety standards, and this can cause the job to be stressful.

Frequently, mechanics must lift or pull objects weighing more than 70 pounds. They often stand, lie, or kneel in awkward positions and occasionally must work in precarious positions, such as on scaffolds or ladders. Noise and vibration are common when engines are being tested, so ear protection is necessary. According to BLS data, full-time aircraft mechanics and service technicians experienced a higher than average work-related injury and illness rate. Aircraft mechanics usually work 40 hours a week on 8-hour shifts around the clock. Overtime and weekend work is frequent.

Training, Other Qualifications, and Advancement About this section

Most mechanics who work on civilian aircraft are certified by the FAA, which requires mechanics to be at least 18 years of age, fluent in English, and have a high school diploma or its equivalent in addition to having the needed technical skills. Most mechanics learn their skills in an FAA-certified Aviation Maintenance Technician School.

Education and training. Although a few people become mechanics through on-the-job training, most learn the skills needed to do their jobs in 1 of about 170 Aviation Maintenance Technician schools certified by the FAA. By law, FAA standards require that certified mechanic schools offer students a minimum of 1,900 class-hours. Coursework in schools normally lasts from 12 to 24 months and provides training with the tools and equipment used on the job. About one-third of these schools award 2-year and 4-year degrees in avionics, aviation technology, or aviation maintenance management.

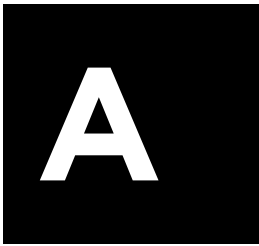
Aircraft trade schools are placing more emphasis on technologies such as turbine engines, composite materials, and aviation electronics, which are increasingly being used in the construction of new aircraft. Technological advances have also affected aircraft maintenance, meaning mechanics must have an especially strong background in computers and electronics to get or keep jobs in this field.

Courses in mathematics, physics, chemistry, electronics, computer science, and mechanical drawing are helpful because they demonstrate many of the principles involved in the operation of aircraft, and knowledge of these principles is often necessary to make repairs. Courses that develop writing skills also are important because mechanics are often required to submit reports. Mechanics must be able to read, write, and understand English. A few mechanics are trained on the job by experienced mechanics. Their work must be supervised and documented by certified mechanics until they have FAA certificates.

Licensure. The FAA requires that all maintenance work on aircraft be performed by certified mechanics or under the supervision of a certified mechanic. As a result, most airlines hire mechanics that have FAA certification. The FAA offers certification for airframe mechanics and powerplant mechanics, although most airlines prefer to hire mechanics with a combined A&P certificate.

Mechanics need at least 18 months of work experience before applying for an airframe or powerplant certificate, and 30 months of experience working with both engines and airframes for a combined A&P certificate, although completion of a program at an FAA-certified school can be substituted for these work experience requirements.

In addition to having experience or formal training, applicants for all



certificates must pass written, oral, and practical tests that demonstrate that they can do the work authorized by the certificate. Written tests are administered at one of the many designated computer testing facilities worldwide, while the oral and practical tests are administered by a Designated Mechanic Examiner of the FAA. All tests must be passed within a 24-month period to receive certification.

FAA regulations require current work experience to keep certificates valid. Applicants must have at least 1,000 hours of work experience in the previous 24 months or take a refresher course. Mechanics also must take at least 16 hours of training every 24 months to keep their certificates current. Many mechanics take training courses offered by manufacturers or employers, usually through outside contractors.

The FAA allows certified airframe mechanics who are trained and qualified and who have the proper tools to work on avionics equipment. However, avionics technicians are not required to have FAA certification if they have avionics repair experience from the military or from working for avionics manufacturers. Avionics technicians who work on communications equipment must obtain a restricted radio-telephone operator license from the Federal Communications Commission.

Other qualifications. Aircraft mechanics must do careful and thorough work that requires a high degree of mechanical aptitude. Employers seek applicants who are self-motivated, hard-working, enthusiastic, and able to diagnose and solve complex mechanical problems. Additionally, employers prefer mechanics who can perform a variety of tasks. Agility is important for the reaching and climbing necessary to do the job. Because they may work on the tops of wings and fuselages on large jet planes, aircraft mechanics must not be afraid of heights.

Advances in computer technology, aircraft systems, and the materials used to manufacture airplanes have made mechanics' jobs more highly technical. Aircraft mechanics must possess the skills necessary to troubleshoot and diagnose complex aircraft systems. They also must continually update their skills with and knowledge of new technology and advances in aircraft technology.

Some aircraft mechanics in the Armed Forces acquire enough general experience to satisfy the work experience requirements for the FAA certificate. With additional study, they may pass the certifying exam. In general, however, jobs in the military services are too specialized to provide the broad experience required by the FAA. Most Armed Forces mechanics have to complete the entire FAA training program, although a few receive some credit for the material they learned in the service. In any case, military experience is a great advantage when seeking employment; employers consider applicants with formal training to be the most desirable applicants.

Advancement. As aircraft mechanics gain experience, they may advance to lead mechanic (or crew chief), inspector, lead inspector, or shop supervisor positions. Opportunities are best for those who have an aircraft inspector's authorization. To obtain an inspector's authorization, a mechanic must have held an A&P certificate for at least 3 years, with 24 months of hands-on experience.

In the airlines, where promotion often is determined by examination, supervisors sometimes advance to executive positions. Those with broad experience in maintenance and overhaul might become inspectors with the FAA. With additional business and management training, some open their own aircraft maintenance facilities. Mechanics with the necessary pilot licenses and flying experience may take the FAA examination for the position of flight engineer, with opportunities to become pilots.

Mechanics and technicians learn many different skills in their training that can be applied to other jobs, and some transfer to other skilled repairer occupations or electronics technician jobs. For example, some avionics technicians continue their education and become aviation engineers, electrical engineers (specializing in circuit design and testing), or communication engineers. Others become repair consultants, in-house electronics designers, or join research groups that test and develop products.

Employment About this section

Aircraft and avionics equipment mechanics and service technicians held about 140,300 jobs in 2008; about 87 percent of these workers were aircraft mechanics and service technicians; the rest were avionics technicians.

Employment of aircraft and avionics equipment mechanics and service technicians primarily is concentrated in a small number of industries. Almost half of aircraft and avionics equipment mechanics and service technicians worked in air transportation and support activities for air transportation. About 21 percent worked in aerospace product and parts manufacturing and about 15 percent worked for the Federal Government. Most of the rest worked for companies that operate their own planes to transport executives and cargo.

Most airline mechanics and service technicians work at major airports near large cities. Civilian mechanics employed by the U.S. Armed Forces work at military installations.

Job Outlook About this section

Job growth for aircraft and avionics equipment mechanics and service technicians is expected to be about as fast as the average for all occupations. Job opportunities should be favorable for people who have completed an aircraft mechanic training program, but keen competition is likely for jobs at major airlines.

Employment change. Employment is expected to increase by 7 percent during the 2008-18 period, which is about as fast as the average for all occupations. Passenger air traffic is expected to increase as the result of an expanding economy and a growing population, and the need for aircraft mechanics and service technicians will grow accordingly. Although there is an increasing trend for some large airlines to outsource aircraft and avionics equipment mechanic jobs overseas, most airline companies still prefer that aircraft maintenance be performed in the U.S. because overseas contractors may not comply with more stringent U.S. safety regulations.

Job prospects. Most job openings for aircraft mechanics through the year 2018 will stem from the need to replace the many mechanics expected to retire over the next decade. In addition, some mechanics will leave to work in related fields, such as automobile repair, as their skills are largely transferable to other maintenance and repair occupations.

Also contributing to favorable future job opportunities for mechanics is the long-term trend toward fewer students entering technical schools to learn skilled maintenance and repair trades. Many of the students who have the ability and aptitude to work on planes are choosing to go to college, work in computer-related fields, or go into other repair and maintenance occupations with better working conditions. If this trend continues, the supply of trained aviation mechanics may not keep up with the needs of the air transportation industry.

Job opportunities will continue to be the best at small commuter and regional airlines, at FAA repair stations, and in general aviation. Commuter and regional airlines is the fastest growing segment of the air transportation industry, but wages in these airlines tend to be lower than those in the major airlines, so they attract fewer job applicants. Also, some jobs will become available as experienced mechanics leave for higher paying jobs with the major airlines or transfer to other occupations. Mechanics will face more competition for jobs with large airlines because the high wages and travel benefits that these jobs offer generally attract more qualified applicants than there are openings.

Nonetheless, job opportunities with the airlines are expected to be better than they have been in the past. In general, prospects will be best for applicants with experience and an A&P certification. Mechanics who keep abreast of technological advances in electronics, composite materials, and other areas will be in greatest demand. Also, mechanics who are willing to relocate to smaller rural areas will have better job opportunities.

Avionics technicians who are trained to work with complex aircraft systems, performing some duties normally performed by certified A&P mechanics, should have the best job prospects. Additionally, technicians with licensing that enables them to work on the airplane, either removing or reinstalling equipment, are expected to be in especially high demand.

Earnings About this section

Median hourly wages of aircraft mechanics and service technicians were about \$24.71 in May 2008. The middle 50 percent earned between \$20.25 and \$29.25. The lowest 10 percent earned less than \$15.85, and the highest 10 percent earned more than \$33.19. Median hourly wages in the industries employing the largest numbers of aircraft mechanics and service technicians in May 2008 were:

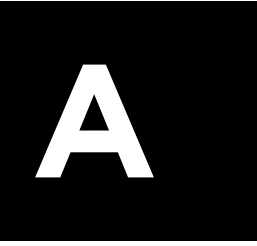
Scheduled air transportation	\$27.96
Federal Executive Branch	24.98
Aerospace product and parts manufacturing	24.47
Nonscheduled air transportation	24.27
Support activities for air transportation	20.95

Median hourly wages of avionics technicians were about \$23.71 in May 2008. The middle 50 percent earned between \$20.10 and \$28.02. The lowest 10 percent earned less than \$16.45, and the highest 10 percent earned more than \$30.87.

Mechanics who work on jets for the major airlines generally earn more

than those working on other aircraft. Those who graduate from an aviation maintenance technician school often earn higher starting salaries than individuals who receive training in the Armed Forces or on the job. Airline mechanics and their immediate families receive reduced-fare transportation on their own and most other airlines.

Almost 3 in 10 aircraft and avionics equipment mechanics and service technicians are members of unions or covered by union agreements. The principal unions are the International Association of Machinists and Aerospace Workers and the Transport Workers Union of America. Some mechanics are represented by the International Brotherhood of Teamsters



Related Occupations About this section

Workers in some other occupations that involve similar mechanical and electrical work include:

Automotive service technicians and mechanics

Electrical and electronics installers and repairers

Electricians

Elevator installers and repairers.