

AVIATION CAREERS SERIES
AVIATION MAINTENANCE AND AVIONICS



U S Department of Transportation
Federal Aviation Administration

Office of Training and Higher Education
Aviation Education Division

Including:

Airframe and Powerplant Technicians
Avionics Technicians



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of Transportation
**Federal Aviation
Administration**

INTRODUCTION

Aviation has progressed a long way since the 120-foot flight by Orville Wright on December 17, 1903, at Kitty Hawk, North Carolina, and since the first US airline began operating between Tampa and St. Petersburg, Florida, on January , 1914. Today, supersonic aircraft fly routinely across the oceans, and more than two million people are employed in aviation, the aerospace and air transportation industries.

In response to its Congressional mandate, the Federal Aviation Administration, as part of its effort to plan for the future of air transportation, conducts an Aviation Education Program to inform students, teachers, and the public about the Nation's air transportation system.

Aviation offers many varied opportunities for exciting and rewarding careers. The purpose of this brochure, and others in the FAA Aviation Careers Series, is to provide information that will be useful in making career decisions. Publications in this series include:

- 1. Pilots & Flight Engineers*
- 2. Flight Attendants*
- 3. Airline Non-Flying Careers*
- 4. Aircraft Manufacturing*
- 5. Aviation Maintenance and Avionics*
- 6. Airport Careers*
- 7. Government Careers*

There is also an overview brochure entitled "Your Career in Aviation: The Sky's the Limit," and a brochure entitled "Women in Aviation."

Free brochures may be obtained by sending a self-addressed mailing label with your request to: Superintendent of Documents, Retail Distribution Division, Consigned Branch, 8610 Cherry Lane, Laurel, MD 20707.

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Aviation Careers Series—Aviation Maintenance and Avionics

AVIATION MAINTENANCE AND AVIONICS

Nature of the Work

Aviation maintenance technicians (including airframe and powerplant technicians, avionics technicians, and instrument repairmen) have an important responsibility of keeping airplanes operating safely and efficiently. To this end, they service, repair, and overhaul aircraft components and systems including airframes, engines, electrical and hydraulic systems, propellers, avionics equipment, and aircraft instruments. The work has changed greatly in recent years, and it will continue to change rapidly because of space age advances in computer technology, electronics, and fiber composite structural material.

Aircraft maintenance technicians employed by the airlines perform line maintenance work on in-service aircraft (that is, routine maintenance, servicing, or other repairs and inspections at airline terminals); and other work such as scheduled periodic inspections and major airframe alterations at an airline's overhaul and maintenance base. The maintenance and repair work of aircraft maintenance technicians employed in general aviation is similar to that of airline technicians. General aviation maintenance technicians, however, often work on small piston-engine as well as larger turbine-engine powered aircraft, and associated equipment, depending on the type of business the facility specializes in. They may also work on airline aircraft when employed by a facility which provides contract maintenance to an airline.

Aircraft maintenance technicians may be licensed or unlicensed. FAA Mechanic Certificates are issued upon successful completion of written, oral, and practical examinations. An FAA certified mechanic may have an airframe rating, a powerplant rating, or both (expressed as A&P). Mechanics can work only on the specific parts of the aircraft (that is, engines, airframe, and systems) for which they are rated, qualified, and equipped to do so.

Similarly, a mechanic with an FAA Repairman Certificate can work only on those parts of the aircraft that the certificate specifically allows, such as radio or instruments, propellers, etc. The Federal Aviation Regulations do not require the repair person who works on aircraft transmitting equipment to possess a license from the Federal Communications Commission (FCC). However, in order to comply with FCC regulations, they must at least work under the supervision of a licensed person if they make certain adjustments to the transmitter.

If you have an interest in electronics, you may choose to specialize in avionics, a field that includes aircraft navigation and communication radios, weather radar systems, autopilots,

navigation, engine and other instruments, and computers. These responsibilities are becoming more interesting and challenging as the technology expands. In the past, avionics systems were added to an airplane almost as an afterthought. Today, however they are an integral part of the design, including sophisticated digital aircraft and vastly increase their capability. These designs include equipment and systems which control flight, engine and other primary functions by digital computers, rather than by mechanical cables and hydraulics.

Avionics specialists are needed who can work shoulder-to-shoulder with airframe and powerplant mechanics. Because of the complexity of modern aircraft and a shortage of technicians, the aviation industry needs more people who are cross-trained: A&Ps who can work on avionics, and avionics technicians who are qualified for airframe work. Thus, the A&P student should consider taking electronics training, and the avionics student should opt for an airframe license. Avionics technicians perform work at the same locations and on the same kinds of aircraft as the A&P mechanic, but larger numbers are employed in the repair shops.

Working Conditions

Depending upon the type of work they do, aircraft mechanics and Staff work in hangars, on the flight line, or in repair shops. They use hand and power tools as well as sophisticated test equipment. Noise levels are high, and flight line mechanics often work outdoors in inclement weather. Sometimes the work requires climbing ladders or scaffolds, as well as the more routine stooping, kneeling, crouching, crawling, reaching, and fingering. The physical demands can be arduous; frequent lifts or pulls up to 50 pounds are not uncommon. Aircraft maintenance technicians often work under pressure to maintain airline flight schedules or, in the case of general aviation, to minimize inconvenience to customers. But they must not sacrifice high standards of workmanship and public trust to speed up the job.

Where the Jobs Are

The scheduled airlines employ mechanics at terminals and overhaul bases throughout the United States, and overseas. The major overhaul facilities are in New York, Los Angeles, San Francisco, Denver, Atlanta, Kansas City, Tulsa, and Minneapolis. Mechanics who have acquired seniority can "bid out" to work at the line station of their choice. These line stations are located at every airport the airline services.

Mechanics are also employed in general aviation. They work for air taxi and fixed base operators; FAA certified repair stations; aerial applicators such as crop dusting and fire suppressant, flight training schools; corporations owning fleets of aircraft; and aircraft manufacturers. As an example, there are some 4,000 FAA certified repair stations in the United States that employ mechanics and technicians.

The US Government employs many civilian aircraft mechanics and avionics technicians to work on military aircraft at Army, Navy, Marine Corps, and Air Force installations in the States and overseas. Another large employer is the Federal Aviation Administration. FAA maintenance personnel work at various locations at home and abroad. Most of the FAA jobs for mechanics and technicians are in Oklahoma City, Oklahoma, at the FAA's main overhaul base.

Wages and Benefits

Airline mechanics generally work 40 hours a week on eight-hour shifts around the clock, and overtime work is common. The major airlines pay entry-level wages of \$11 to \$16 an hour. A licensed A&P or avionics technician with a major airline can earn between \$35,000 and \$45,000 or more within five years, with top pay escalating to as high as \$65,000. Airlines historically have pay incentives for licenses such as A&P, FCC, and Avionics Repairman Certificates.

In the general aviation shops, the starting wage ranges from about \$8 to \$12 an hour, depending on qualifications and location. Top pay runs from about \$14 to \$20 an hour.

Paid holidays, vacations, insurance plans, retirement programs, and sick leave are some of the benefits offered by the airlines and general aviation employers. Airline employees enjoy free or reduced-fare transportation to destinations within the airline's route structure, as well as exchange travel privileges with other airlines. On the other hand, general aviation offers more local jobs than do the airlines.

Opportunities for Advancement

FAA certification is the key to advancement in this field since apprentice mechanics can work only under the supervision of a certified mechanic. An applicant who is a graduate of an approved aviation maintenance technician course, is eligible for the FAA Mechanic Certificate with an A&P rating. Apprentice mechanics with 18 months of airframe experience or powerplant experience or 30 months of combined experience may take the airframe, powerplant, or the airframe and powerplant exams. Mechanics who attain these top ratings have a better opportunity to advance to higher paying jobs as lead mechanics, crew chiefs, inspectors, or shop foremen. Promotion to these higher grade jobs with the airlines is usually based on seniority within the company.

Applicants for a repairman certificate must have 18 months of practical experience in the maintenance duties of the specific job for which the person is employed. Or the applicant must have completed formal training acceptable to the FAA. Avionics repair stations may require radio technicians to hold an FCC license.

Persons with administrative ability may be promoted to supervisory and executive positions. There are also opportunities for those who have broad experience in maintenance and overhaul facilities to become Designated Airworthiness Representatives (DARs) for the Federal Aviation Administration, and FAA aviation safety inspectors.

Mechanics with the necessary pilot qualifications can take the FAA examination for the night engineer certificate, which can lead to career opportunities as airline pilots.

Requirements To Enter The Job

While a high school diploma is not required to become an apprentice aircraft mechanic, employers are more likely to hire applicants who are high school or vocational school graduates. Mathematics, physics, computer science, chemistry, English, and aerospace education courses are suitable subjects to pursue while in high school because the aircraft mechanic and avionics technician must understand the physical principles involved in the operation of the aircraft and its systems. To attend a technical school or a college offering A&P training, a high school diploma is normally needed. An applicant is not likely to be considered for a job related to even an apprentice level without having either a sound high school educational background or aviation-oriented vocational training. Once hired, the aircraft mechanic is expected to continue his or her education in order to keep abreast of technical improvements in aircraft and associated systems.

Many universities now offer two- and four-year programs that provide degrees such as Associate in Avionics, Aviation Technology, and Aviation Maintenance Management. A four-year program can train an individual who fits between the technician and the engineer: somebody who can communicate with both sides, working as a field representative or customer service representative in the avionics or aircraft manufacturing industries. Some institutions maintain an FAA repair station, so students get practical experience working on aircraft.

In sum, educational requirements have expanded as the technology has become more advanced. Students today have the chance to qualify for higher salaries and more interesting jobs than ever before. Those who wish to succeed must have above-average mechanical ability and a desire to work with their hands as well as their minds. They should be aware of the importance of doing a job competently and thoroughly, and they must be willing to continue training throughout their career.

Opportunities For Training

Qualified students who wish to become aircraft maintenance technicians can follow one of three paths:

First, they “learn as they earn” by beginning to work for an airline or an independent repair station as an apprentice mechanic.

Second, they can take aircraft mechanic courses at one of the many FAA-certified private or public technical schools. A high school diploma is recommended for entrance to these schools. Training is normally shorter than on-the-job training, and earnings upon completion of the course are higher. The graduate of such a course is qualified to take the FAA exams. Schools which offer avionics technician training are usually associated with a public or private university school system.

Third, persons wishing to become aircraft mechanics and avionics technicians can be trained while in the military service and, with some additional study, can qualify for a civilian mechanic job when the period of military service is completed.

Technical school training is expensive—several thousand dollars for an 18-to 24-month course. Fortunately, financial assistance is available through the US Department of Education. For information, write to the Office of Student Financial Assistance, 400 Maryland Ave., SW., Washington, DC 20202. To obtain a list of the names and location of FAA certified aviation maintenance technician schools (Advisory Circular 147-2Y), send \$1.00 to the Superintendent of Documents, Government Printing Office, Washington, DC 20402-9371.

The World Aviation Directory, which can be found in the reference section of many libraries, has the most comprehensive listing of aircraft operators, manufacturers, and associated companies that design, produce, overhaul, and maintain aircraft. The Air Transport Association of America, 1709 New York Ave., NW., Washington, DC 20006, can furnish a list of its members, as can the Regional Airline Association, 1101 Connecticut Ave., NW., Suite 700, Washington, DC 20036. The Aircraft Electronics Association can furnish a list of their members, which includes avionics equipment manufacturers and repair shops. Also, the Association’s Educational Foundation awards scholarships to students who are attending or planning to attend an accredited school in an avionics or aircraft repair program. Contact the Aircraft Electronics Association at PO Box 1981, Independence, MO 64055.

Outlook for the Future

It is anticipated that the demand for aircraft and avionics maintenance personnel will increase, due to a combination of industry expansion and retirement, to the point where a total of more than 75,000 additional technicians will be needed by the year 2004.

WHAT AIRFRAME AND POWERPLANT MECHANICS SAY ABOUT THEIR JOBS

Max Bucher
A&P Mechanic
Beechcraft West
Van Nuys, California

In addition to regular maintenance, we do inspections on aircraft to make sure that they are in safe condition. We make sure the engines are putting out enough power, make sure all the electrical systems and other systems are working properly.

The requirements are 1,900 hours of training to become an A&P mechanic. I took a 14-month course at a school in Texas. For a pretty good school you can pay up to \$10,000, and most of them have Federal aid and grants.

You have to get that certificate. It's very hard finding a job in aviation without it. Like anywhere else, certification also adds to your pay. You have to find a job that will give you a lot of experience, and you can get that from a smaller outfit. Most of those entry level jobs will not get you a lot of pay.

Richard Bennett
Manager of Aircraft Maintenance
The Upjohn Company Corporate Flight Department
Kalamazoo, Michigan

I have always felt aircraft maintenance is one of the most rewarding careers anyone could pursue. I am a strong advocate of work ethics, professionalism, and continuing education.

Sandra MacKellar
Chief of Maintenance
Whirlpool Corporation Flight Dept.
Benton Harbor, Michigan

I encourage anyone with an interest in aircraft to look into the many opportunities that exist for them in the aviation field.