
Aircraft Pilots and Flight Engineers

(O*NET 53-2011.00, 53-2012.00)

Significant Points

- Regional and low-cost airlines offer the best opportunities; pilots attempting to get jobs at the major airlines will face strong competition.
- Pilots usually start with smaller commuter and regional airlines to acquire the experience needed to qualify for higher paying jobs with national or major airlines.
- Many pilots have learned to fly in the military, but growing numbers have college degrees with flight training from civilian flying schools that are certified by the Federal Aviation Administration (FAA).

Nature of the Work

Pilots are highly trained professionals who either fly airplanes or helicopters to carry out a wide variety of tasks. Most are *airline pilots*, *copilots*, and *flight engineers* who transport passengers and cargo. However, 1 out of 5 pilots is a commercial pilot involved in dusting crops, spreading seed for reforestation, testing aircraft, flying passengers and cargo to areas not served by regular airlines, directing firefighting efforts, tracking criminals, monitoring traffic, and rescuing and evacuating injured persons.

Before departure, pilots plan their flights carefully. They thoroughly check their aircraft to make sure that the engines, controls, instruments, and other systems are functioning properly. They also make sure that baggage or cargo has been loaded correctly. They confer with flight dispatchers and aviation weather forecasters to find out about weather conditions en route and at their destination. Based on this information, they choose a route, altitude, and speed that will provide the safest, most economical, and smoothest flight. When flying under instrument flight rules—procedures governing the operation of the aircraft when there is poor visibility—the pilot in command, or the company dispatcher, normally files an instrument flight plan with air traffic control so that the flight can be coordinated with other air traffic.

Takeoff and landing are the most difficult parts of the flight, and require close coordination between the two pilots. For example, as the plane accelerates for takeoff, the pilot who is flying the take off concentrates on the runway while the other pilot scans the instrument panel. To calculate the speed they must attain to become airborne, pilots consider the altitude of the airport, outside temperature, weight of the plane, and speed and direction of the wind. The moment the plane reaches takeoff speed, the nonflying pilot informs the flying pilot, who then pulls back on the controls to raise the nose of the plane. Captains and first officers usually alternate flying each leg from takeoff to landing.

Unless the weather is bad, the flight itself is relatively routine. Airplane pilots, with the assistance of autopilot and the flight management computer, steer the plane along their planned route and are monitored by the air traffic control stations they pass along the way. They regularly scan the instrument panel

to check their fuel supply; the condition of their engines; and the air-conditioning, hydraulic, and other systems. Pilots may request a change in altitude or route if circumstances dictate. For example, if the ride is rougher than expected, pilots may ask air traffic control if pilots flying at other altitudes have reported better conditions; if so, they may request an altitude change. This procedure also may be used to find a stronger tailwind or a weaker headwind to save fuel and increase speed. In contrast, because helicopters are used for short trips at relatively low altitude, helicopter pilots must be constantly on the lookout for trees, bridges, power lines, transmission towers, and other dangerous obstacles as well as low-flying general aviation aircraft. Regardless of the type of aircraft, all pilots must monitor warning devices designed to help detect sudden shifts in wind conditions that can cause crashes.

Pilots must rely completely on their instruments when visibility is poor. On the basis of altimeter readings, they know how high above ground they are and whether they can fly safely over mountains and other obstacles. Special navigation radios give pilots precise information that, with the help of special charts, tells them their exact position. Other very sophisticated equipment provides directions to a point just above the end of a runway and enables pilots to land completely without an outside visual reference. Once on the ground, pilots must complete records on their flight and the aircraft maintenance status for their company and the FAA.

The number of nonflying duties that pilots have depends on the employment setting. Airline pilots have the services of large support staffs and, consequently, perform few nonflying duties. However, because of the large numbers of passengers, airline pilots may be called upon to coordinate handling of disgruntled or disruptive passengers. Also, under the Federal Flight Deck Officer program airline pilots who undergo rigorous training and screening are deputized as Federal law enforcement officers and are issued firearms to protect the cockpit against intruders and hijackers. Pilots employed by other organizations, such as charter operators or businesses, have many other duties. They may load the aircraft, handle all passenger luggage to ensure a balanced load, and supervise refueling; other nonflying responsibilities include keeping records, scheduling flights, arranging for major maintenance, and performing minor aircraft maintenance and repairs.

Except on small aircraft, two pilots usually make up the cockpit crew. Generally, the most experienced pilot, the *captain*, is in command and supervises all other crew members. The pilot and the copilot, often called the first officer, share flying and other duties, such as communicating with air traffic controllers and monitoring the instruments. Some large aircraft have a third crewmember, the flight engineer, who assists the pilots by monitoring and operating many of the instruments and systems, making minor in-flight repairs, and watching for other aircraft. The flight engineer also assists the pilots with the company, air traffic control, and cabin crew communications. New technology can perform many flight tasks, however, and virtually all new aircraft now fly with only two pilots, who rely more heavily on computerized controls.

Some pilots are flight instructors. They teach their students in ground-school classes, in simulators, and in dual-controlled planes and helicopters. A few specially trained pilots are examiners or check pilots. They periodically fly with other pilots or pilot's license applicants to make sure that they are proficient.

Work environment. Most pilots spend a considerable amount of time away from home because the majority of flights involve overnight layovers. When pilots are away from home, the airlines provide hotel accommodations, transportation between the hotel and airport, and an allowance for meals and other expenses.

Airline pilots, especially those on international routes, often experience jet lag—fatigue caused by many hours of flying through different time zones. To guard against pilot fatigue, which could result in unsafe flying conditions, the FAA requires airlines to allow pilots at least 8 hours of uninterrupted rest in the 24 hours before finishing their flight duty.

Commercial pilots face other types of job hazards. The work of test pilots, who check the flight performance of new and experimental planes, may be dangerous. Pilots who are crop-dusters may be exposed to toxic chemicals and seldom have the benefit of a regular landing strip. Helicopter pilots involved in rescue and police work may be subject to personal injury.

Although flying does not involve much physical effort, the mental stress of being responsible for a safe flight, regardless of the weather, can be tiring. Pilots must be alert and quick to react if something goes wrong, particularly during takeoff and landing.

FAA regulations limit flying time of airline pilots of large aircraft to a maximum of 100 hours a month or 1,000 hours a year. Most airline pilots fly an average of 65 to 75 hours a month and work at least an additional 65 to 75 hours a month performing nonflying duties. Most pilots have variable work schedules, working several days on, then several days off. Airlines operate flights at all hours of the day and night, so work schedules often are irregular. Flight assignments are based on seniority; the sooner pilots are hired, the stronger their bidding power is for preferred assignments.

Commercial pilots also may have irregular schedules, flying 30 hours one month and 90 hours the next. Because these pilots frequently have many nonflying responsibilities, they have much less free time than do airline pilots. Except for corporate flight department pilots, most commercial pilots do not remain away from home overnight. But, they may work odd hours.



Pilots have many nonflying duties that include keeping records, scheduling flights, arranging for major maintenance, and performing minor aircraft maintenance and repairs.

However, if the company owns a fleet of planes, pilots may fly a regular schedule.

Flight instructors may have irregular and seasonal work schedules, depending on their students' available time and the weather. Instructors frequently work in the evening or on weekends.

Training, Other Qualifications, and Advancement

All pilots who are paid to transport passengers or cargo must have a commercial pilot's license with an instrument rating issued by the FAA. Helicopter pilots also must hold a commercial pilot's license with a helicopter rating.

Education and training. Although some small airlines hire high school graduates, most airlines require at least 2 years of college and prefer to hire college graduates. In fact, most entrants to this occupation have a college degree. Because the number of college-educated applicants continues to increase, many employers are making a college degree an educational requirement. For example, test pilots often are required to have an engineering degree.

Pilots also need flight experience to qualify for a license. Completing classes at a flight school approved by the FAA can reduce the amount of flight experience required for a pilot's license. In 2006, the FAA certified about 600 civilian flying schools, including some colleges and universities that offer degree credit for pilot training. Initial training for airline pilots typically includes a week of company indoctrination; 3 to 6 weeks of ground school and simulator training; and 25 hours of initial operating experience, including a check-ride with an FAA aviation safety inspector. Once trained, pilots are required to attend recurrent training and simulator checks once or twice a year throughout their career.

Licensure. To qualify for FAA licensure, applicants must be at least 18 years old and have at least 250 hours of flight experience.

The U.S. Armed Forces have always been an important source of experienced pilots because of the extensive flying time and experience on jet aircraft and helicopters. Those without Armed Forces training may become pilots by attending flight schools or by taking lessons from FAA-certified flight instructors. Applicants also must pass a strict physical examination to make sure that they are in good health and have 20/20 vision with or without glasses, good hearing, and no physical handicaps that could impair their performance. They must pass a written test that includes questions on the principles of safe flight, navigation techniques, and FAA regulations, and must demonstrate their flying ability to FAA or designated examiners.

To fly during periods of low visibility, pilots must be rated by the FAA to fly by instruments. Pilots may qualify for this rating by having the required hours of flight experience, including 40 hours of experience in flying by instruments; they also must pass a written examination on procedures and FAA regulations covering instrument flying and demonstrate to an examiner their ability to fly by instruments. Requirements for the instrument rating vary depending on the certification level of flight school.

Airline pilots must fulfill additional requirements. Captains must have an airline transport pilot's license. Applicants for this license must be at least 23 years old and have a minimum

of 1,500 hours of flying experience, including night and instrument flying, and must pass FAA written and flight examinations. Usually, they also have one or more advanced ratings depending on the requirements of their particular job. Because pilots must be able to make quick decisions and accurate judgments under pressure, many airline companies reject applicants who do not pass required psychological and aptitude tests. All licenses are valid so long as a pilot can pass the periodic physical and eye examinations and tests of flying skills required by the FAA and company regulations.

Other qualifications. Depending on the type of aircraft, new airline pilots start as first officers or flight engineers. Although some airlines favor applicants who already have a flight engineer's license, they may provide flight engineer training for those who have only the commercial license. Many pilots begin with smaller regional or commuter airlines, where they obtain experience flying passengers on scheduled flights into busy airports in all weather conditions. These jobs often lead to higher paying jobs with bigger, national or major airlines.

Companies other than airlines usually require less flying experience. However, a commercial pilot's license is a minimum requirement, and employers prefer applicants who have experience in the type of craft they will be flying. New employees usually start as first officers, or fly less sophisticated equipment.

Advancement. Advancement for pilots usually is limited to other flying jobs. Many pilots start as flight instructors, building up their flying hours while they earn money teaching. As they become more experienced, these pilots occasionally fly charter planes or perhaps get jobs with small air transportation firms, such as air-taxi companies. Some advance to flying corporate planes. A small number get flight engineer jobs with the airlines.

In the airlines, advancement usually depends on seniority provisions of union contracts. After 1 to 5 years, flight engineers advance according to seniority to first officer and, after 5 to 15 years, to captain. Seniority also determines which pilots get the more desirable routes. In a nonairline job, a first officer may advance to captain and, in large companies, to chief pilot or director of aviation in charge of aircraft scheduling, maintenance, and flight procedures.

Employment

Civilian aircraft pilots and flight engineers held about 107,000 jobs in 2006. About 79,000 worked as airline pilots, copilots, and flight engineers. The rest were commercial pilots who worked as flight instructors at local airports or for large businesses that fly company cargo and executives in their own airplanes or helicopters. Some commercial pilots flew small

planes for air-taxi companies, usually to or from lightly traveled airports not served by major airlines. Others worked for a variety of businesses, performing tasks such as dusting crops, inspecting pipelines, or conducting sightseeing trips.

Pilots are located across the country, but airline pilots usually are based near major metropolitan airports or airports operating as hubs for the major airlines.

Federal, State, and local governments employed pilots. A few pilots were self-employed.

Job Outlook

Regional airlines and low-cost carriers will present the best opportunities; pilots attempting to get jobs at the major airlines will face strong competition.

Employment change. Employment of aircraft pilots and flight engineers is projected to grow 13 percent from 2006 to 2016, about as fast as the average for all occupations. Population growth and an expanding economy are expected to boost the demand for air travel, contributing to job growth. New jobs will be created as airlines expand their capacity to meet this rising demand by increasing the number of planes in operation. However, employment growth will be limited by productivity improvements as airlines switch to larger planes and adopt the low-cost carrier model that emphasizes faster turnaround times for flights, keeping more pilots in the air rather than waiting on the ground. Also, fewer flight engineers will be needed as new planes requiring only two pilots replace older planes that require flight engineers.

Job prospects. Job opportunities are expected to continue to be better with the regional airlines and low-cost carriers, which are growing faster than the major airlines. Opportunities with air cargo carriers also should arise because of increasing security requirements for shipping freight on passenger airlines, growth in electronic commerce, and increased demand for global freight. Business, corporate, and on-demand air taxi travel also should provide some new jobs for pilots.

Pilots attempting to get jobs at the major airlines will face strong competition, as those firms tend to attract many more applicants than the number of job openings. Applicants also will have to compete with laid-off pilots for any available jobs. Pilots who have logged the greatest number of flying hours using sophisticated equipment typically have the best prospects. For this reason, military pilots often have an advantage over other applicants.

In the long run, demand for air travel is expected to grow along with the population and the economy. In the short run, however, employment opportunities of pilots generally are sensitive to cyclical swings in the economy. During recessions, when a decline in the demand for air travel forces airlines to

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Aircraft pilots and flight engineers	53-2010	107,000	121,000	14,000	13
Airline pilots, copilots, and flight engineers	53-2011	79,000	90,000	10,000	13
Commercial pilots	53-2012	28,000	31,000	3,600	13

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

curtail the number of flights, airlines may temporarily furlough some pilots.

Earnings

Earnings of aircraft pilots and flight engineers vary greatly depending whether they work as airline or commercial pilots. Earnings of airline pilots are among the highest in the Nation, and depend on factors such as the type, size, and maximum speed of the plane and the number of hours and miles flown. For example, pilots who fly jet aircraft usually earn higher salaries than pilots who fly turboprops. Airline pilots and flight engineers may earn extra pay for night and international flights.

Airline pilots usually are eligible for life and health insurance plans. They also receive retirement benefits and, if they fail the FAA physical examination at some point in their careers, they get disability payments. In addition, pilots receive an expense allowance, or "per diem," for every hour they are away from home. Some airlines also provide allowances to pilots for purchasing and cleaning their uniforms. As an additional benefit, pilots and their immediate families usually are entitled to free or reduced-fare transportation on their own and other airlines.

More than half of all aircraft pilots are members of unions. Most of the pilots who fly for the major airlines are members of the Air Line Pilots Association, International, but those employed by one major airline are members of the Allied Pilots Association.

Related Occupations

Although they are not in the cockpit, air traffic controllers and airfield operations specialists also play an important role in making sure flights are safe and on schedule, and participate in many of the decisions that pilots must make.

Sources of Additional Information

For information about job opportunities, salaries, and qualifications, write to the personnel manager of the particular airline.

For information on airline pilots, contact:

➤ Air Line Pilots Association, International, 1625 Massachusetts Ave. NW., Washington, DC 20036.

➤ Air Transport Association of America, Inc., 1301 Pennsylvania Ave. NW., Suite 1100, Washington, DC 20004.

➤ Federal Aviation Administration, 800 Independence Ave. SW., Washington, DC 20591. Internet: <http://www.faa.gov>

For information on helicopter pilots, contact:

➤ Helicopter Association International, 1635 Prince St., Alexandria, VA 22314.

For information about job opportunities in companies other than airlines, consult the classified section of aviation trade magazines and apply to companies that operate aircraft at local airports.