# AVIATION CAREERS SERIES

## *PILOTS AND FLIGHT ENGINEERS*

U.S. Department of Transportation
**Federal Aviation Administration**
Office of Public Affairs
Aviation Education Program

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U.S. Department
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 U.S. airline began operating between Tampa and St. Petersburg, Florida, on January 1, 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.

# ACKNOWLEDGEMENT

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# Aviation Careers Series—Pilots and Flight Engineers

## GENERAL INFORMATION

Most people would agree that the most glamorous, exciting, and challenging job in aviation is that of the pilot. The pilot is at the controls of a plane and is ultimately responsible for a safe, comfortable, and efficient flight. This is what aviation is all about!

There are many kinds of piloting jobs. In some, the pilot flies alone, performing such functions as agricultural spraying, pipeline patrol, or fish spotting. Or a pilot may be a flight instructor who trains student pilots. Then there is the pilot whose job it is to transport people by flying a corporate plane or working for an airline. These and other piloting jobs will be described in the pages that follow.

The flight engineer serves as an important crew member in certain types of air transport planes. He or she may eventually become a pilot. Piloting jobs vary, but a number of conditions are common to all pilots.

First, all pilots flying for hire have completed a flight training program and have earned a commercial pilot's license or an airline transport rating. Usually they also have one or more advanced ratings (such as instrument, multi-engine, or aircraft-type ratings), depending upon the requirements of their particular flying jobs.

Second, all pilots have a similar "office," the cockpit. It contains the controls, instruments, and electronic communication and navigation equipment necessary to operate the aircraft. Some noise and vibration are noticeable, particularly in propeller aircraft.

Third, all pilots are concerned about safety—including the safe condition or airworthiness of the plane, weather factors affecting the safety of the flight, proper use of navigation aids, and adherence to air traffic control procedures.

Fourth, all pilots have a dual responsibility. Not only must they satisfy their employer, who might be an air taxi or airline operator, but they also must demonstrate to the Federal Aviation Administration (FAA) that their flying skills, knowledge, and health are at all times acceptable for the particular flying jobs they perform.

Finally, all pilots must undergo frequent physical examinations to determine whether they meet certain medical standards. These standards vary according to the license that the pilot holds. A Class I Medical Certificate requires the highest standards for vision, hearing, equilibrium, and general physical condition. The pilot must have an exceptionally good health history with no evidence of organic and nervous diseases or mental disorders. A Class II Medical Certificate is less rigid, but it still requires a high degree of physical health and an excellent medical history. A Class III Medical Certificate has the least stringent physical requirements. All three classes of medical certificates allow the pilot to wear glasses provided the correction is within the prescribed limits of vision. Drug or alcohol abuse will disqualify any applicant.

The more flying hours and flying skills a pilot has, the more opportunities he or she has for advancement as a pilot. As flying hours are accumulated and additional skills are mastered, pilots have many chances to transfer from one kind of pilot job to another. Frequently, pilots double as flight instructors and air taxi pilots, or they operate an aircraft repair station with flight instruction and air taxi operations as sidelines. Many good aviation and airline flight crew jobs qualify pilots for jobs with governmental agencies, such as the FAA.

The average salary for a senior captain with a major airline is nearly $140,000 per year; regional airline pilots make $30,000 to $32,000. Corporate pilots can earn $40,000 or more. Salaries vary significantly, based upon the individual's education, experience, and length of service.

## AIRLINE CAPTAIN

### *Nature of the Work*

The airline captain bears the ultimate responsibility for each flight he or she conducts. The captain plans each flight with the airline's flight dispatcher and meteorologist; they check weight, fuel supply, weather in all portions of the route, and an alternate airport in the event of unforeseen bad weather. The captain also briefs the crew, checks out takeoff procedures, and, in conjunction with the first officer (co-pilot), ascertains that all systems are operating normally. The captain and first

# QUICK REFERENCE FOR AVIATION JOBS AND ASSOCIATED BENEFITS

| REQUIREMENTS | | | | | WAGES & BENEFITS | | |
|---|---|---|---|---|---|---|---|
| ***Type of Pilot/ Instructor*** | ***Education*** | ***Licenses & Ratings*** | ***Hours Flying Experience*** | ***Physical Exam*** | ***Average Mid-range Salary*** | ***Additional Wages and Benefits*** | ***Typical Benefits and Privileges*** |
| Flight Instructor | No mandatory level. At least a high school education normally is necessary to absorb instruction. | Commercial, flight instructor's rating instrument rating, | Minimum of 200 hours | Class II | $10.00/hour | Some receive base pay plus hourly rate for flight time or commission when students advance to new ratings. Salary varies with single-engine or multi-engine aircraft. | |
| Corporate Pilot | " | Commercial or Air Transport (ATP) for heavy aircraft & jets. Multi-engine & instrument ratings A&P mechanics license for corporate co-pilot. | 1,500 hours 500 hours required for corporate co-pilot. | Class II | $50,000 | Salary depends on experience and type of aircraft flown. Lowest salaries are for pilots of single-engine planes; highest salaries are for pilots of twinjet and four-engine turboprop jets. | Most companies have retirement plans, stock options, and paid vacations |
| Air Taxi or Charter Pilot | " | Commercial, instrument rating. | 1,000 to 2,000 hours | Class II | $14.00/hour | May also earn extra pay for hours flown above a minimum, or a commission on extra business the pilot produces above a specified minimum gross company income. | |
| Commercial Pilot (Patrol, ferry, helicopter, aerial survey, photography, advertising, sightseeing, ambulance, etc.) | " | Commercial, helicopter (some). Instrument rating, seaplane rating (some). A&P mechanic (some). | Varied | Class II | $20,000 | | |
| Agricultural Pilot | " | Commercial | 500 hours accident-free, precision, low-level flyexperience. Completion of specialized flight training in agricultural applications is preferred. | Class II | $17,000 | Some pilots receive 25% to 40% of the gross receipts they produce. Because work is seasonal, they may earn wages in off-season from other commercial flying jobs that make their total annual income as much as $30,000 to $35,000. | |
| Test Pilots (Experimental or Engineering Test Pilot, Production Test Pilot, Airline Test Pilot) | Engineering degree; preferably aeronautical engineering | Commercial | 500-2,000 hours airline test pilot; 3,000-5,000 hours flying as airline pilot. In all cases, some experience as a military flight test pilot is preferred. | Class I | $47,000 | Some receive an additional amount per hour for hazard pay during tests flights. | Insurance paid by company plus other benefits given to aircraft manufacturer or airline employees in general (paid vacation and sick leave, etc.) |
| Major Airline Captain | College preferred | ATP and Instrument rating. | * | Class I with 20/20 vision as corrected. 21-35 years of age. Height sufficient to operate all controls. | $140,000 | Salary varies with type of airplane, day and night trips, international or domestic routes, passenger or cargo plane. | Paid vacation, insurance-retirement plan, travel privileges, sick leave, group health insurance. Choice of routes and base depend on seniority. |

# QUICK REFERENCE FOR AVIATION JOBS AND ASSOCIATED BENEFITS

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| ***Type of Pilot/ Instructor*** | ***Education*** | ***Licenses & Ratings*** | ***Hours Flying Experience*** | ***Physical Exam*** | ***Average Mid-range Salary*** | ***Additional Wages and Benefits*** | ***Typical Benefits and Privileges*** |
| Major Airliner First Officer | College preferred | Commercial instrument rating ATP preferred | * | Class II (Class I preferred) | $68,000 | Salary varies with type of airplanes, day and night trips, international or domestic routes, passenger or cargo plane. | Paid vacation, insurance-retirement plan, travel privileges, sick leave, group health insurance. Choice of routes & base depend on seniority. |
| Major Airline Flight Engineer | High School or two years college preferred | Commercial instrument rating, A&P mechanic flight engineering rating | 350-1,000 hours | Class II & able to obtain Class I (Class I preferred) | $33,000 | " | " |
| Airline Flight Instructor | College preferred | ATP and Flight Engineering | 2,500 airline flight hours | Class I | $47,000 | Salary varies with size of the airline. | Paid vacation, insurance-retirement plan, travel privileges, sick leave, group health insurance. |

* No starting figures are given as first officers move up to captaincies as vacancies occur.

officer usually alternate between flying the airplane and maintaining radio contact with the appropriate air traffic controller. The type and size of the aircraft varies, depending on the airline. It can range from a light twin for short hops to a jumbo jet for thousands of miles of travel across the country or to a foreign land.

## AIRLINE FIRST OFFICER

### *Nature of the Work*

The Airline Co-Pilot or First Officer assists the captain by monitoring the flight instruments, handling radio communications, watching for air traffic, and taking over the flight controls when directed by the captain.

### Working Conditions

By law, an airline pilot may not fly more than 85 hours a month or 1,000 hours a year. But if ground duties such as filing flight plans, working on reports, briefing crews, and attending training classes are included, the average pilot works more than 100 hours a month. The airline pilot spends most of the working day in the cockpit; additional time is spent in the airline dispatcher's office and in training classrooms. Work schedules average sixteen days a month and usually provide for consecutive days off. Schedules for pilots employed by transcontinental and international airlines require pilots to spend some nights away from home. In these cases, hotel, transportation, and meal expenses are paid by the airline. A flight requires considerable concentration by the pilot during takeoff and landing maneuvers. There is usually an automatic pilot on board to free the captain and first officer from the chore of handling the controls during most of the flight, but continuous vigilance for weather, system malfunctions, and other potential problems is expected of the flight crew. The airline pilot is required to wear a uniform while on duty. Night flights are often required, especially for air cargo operations.

### *Where the Jobs Are*

Scheduled airlines base their flight crews at major terminals on their respective airline routes. These bases are found mainly in New York, Chicago, Los Angeles, San Francisco, Seattle, Detroit, Newark, Atlanta, Miami, Denver, Dallas, Cleveland, and Washington, DC. Jobs for flight crews are also available with all cargo airlines and with non-scheduled and supplemental airlines that provide charter service.

### Opportunities for Advancement

Promotion is regulated by seniority. At the time of hiring, the pilot is assigned the last seniority number at his or her airline. As more senior pilots advance or leave the airline, the newly hired pilot moves upward. All through the pilot's career with the airline, the earnings, route assignments and vacation time preferences are governed by seniority. On major airlines, advancement from first officer to captain is likely to take seven years or longer, but the transition can take a year or less on a commuter airline during a period of rapid expansion. The recent spate of mergers and takeovers of some of the leading airlines has disrupted the normal process of advancement. Over the long term, attrition will take place due to the mandatory retirement ages of 60 for airline pilots and 65 for flight engineers. A pilot's job is on the line every six months at the time of a rigid physical exam. If unable to pass the physical, the pilot must stop flying.

## FLIGHT ENGINEER OR SECOND OFFICER

(The title Second Officer applies when the employee is required to have minimum training as a pilot.)

### *Nature of the Work*

The flight engineer makes walks around the aircraft to check approximately 200 items. He or she oversees fueling operations, reviews mechanics' reports, and participates in the preflight cockpit check. The flight engineer also monitors engines, fuel consumption, and the heating, pressurization, hydraulic, electrical, and air conditioning systems. Flight engineers or second officers troubleshoot and, if possible, repair faulty equipment in flight, check and maintain aircraft log books, report mechanical difficulties to the mechanic crew chief, and make a final post-flight inspection of the aircraft.

### *Outlook for the Future*

Deregulation has affected the airline industry a great deal. Initially, many new regional airlines sprang up, and existing regionals expanded. This was followed by a weeding-out process due to an overabundance of airline service, fare wars, and acquisitions that affected large and small airlines. These factors, coupled with the sensitivity of the airline industry to the state of the

economy, makes it difficult to predict the future. On the positive side, a 1989 report by the National Defense Transportation Association predicted that U.S. airlines will need to hire 53,000 pilots over the next ten years in order to meet increased demands for air travel and to replace retirees. At the present rate of training, it is estimated that there will be only 41,000 qualified pilots available.

### *Opportunities for Pilot Training*

Pilots can receive their training in a number of ways. The first is through instruction at flying schools, often run by fixed-base operators, which are companies that provide a variety of services at an airport. Flight academies and some colleges offer courses geared specifically for the career pilot. The academic college courses may result in a degree. The major airlines traditionally require a college degree, but this requirement might be waived in the face of a pilot shortage.

The student must be at least 16 years of age and must be able to pass a third-class medical examination. As part of ground school instruction, students learn the principles of flight, aerial navigation, weather factors, and flight regulations. Flying lessons are conducted in dual controlled aircraft and include dual and solo air work. The instructor determines when the student is ready to take the written test and flight test that are given by FAA inspectors or designated examiners. Upon successful completion of both exams, a private pilot certificate is awarded. This grants the person the privilege to fly passengers, but not for hire. The private pilot can then receive advanced instruction to acquire an instrument rating, a commercial certificate, and a certified flight instructor rating.

These achievements open up numerous career opportunities for the pilot because he or she can now fly for hire with further study and experience, the pilot could eventually earn the air transport pilot (ATP) certificate necessary to fly as pilot in command of an airliner.

Another method of acquiring flight training is in the armed forces. This entails no expense for the student, but there is a five-year service obligation. With some additional study, the military pilot can qualify for numerous civilian pilot jobs upon leaving the service. The military services have been a major source of pilots for the airlines.

Helicopter pilots can receive training in the armed forces or at private, FAA-certified helicopter flight schools. Agricultural pilots can receive specialized advanced training at agricultural pilot schools.

Some airlines offer courses for corporate pilots who want to learn how to fly jet aircraft. The airlines' experience in jet flight training makes them particularly well qualified to provide this service to business firms.

## FLIGHT INSTRUCTOR

### *Nature of the Work*

Flight instructors teach at various levels. They offer primary instruction for the private pilot certificate as well as more advanced for a commercial certificate, instrument rating, multiengine rating, and air transport rating. Flight instructors demonstrate and explain, on the ground and in the air, basic principles of flight, aerial navigation, weather factors, and Federal Aviation Regulations. They determine when students are ready to fly solo and when they are ready to take the tests necessary for their certificates and ratings.

### *Working Conditions*

Some flight instructors work on staff in aviation academies or colleges that offer flight courses. These instructors receive salaries and work on a schedule that is fairly predictable. Other instructors are independent contractors, or freelancers, for fixed base operators. Their hours are irregular, depending on the availability of customers, the weather, and the time of year. In addition to flight training, they may teach ground school classes during evening hours. When not teaching, some handle charter or air taxi flights.

### *Where the Jobs Are*

Flight schools are located all over the United States in small towns and large cities. The more desirable locations are those that have good flying weather the year-round. The type of work that is most readily available is freelance instruction with a fixed-base operator. Turnover is often high because of the irregularity of the work and the relatively low pay. A freelance instructor working through an FBO may receive $10 or $12 an hour and gross only $10,000 to 15,000 a year.

### *Opportunities for Advancement*

The job of flight instructor often is considered a stepping-stone to more lucrative flying positions. Turnover in personnel and job openings is great. Flight instructors with the necessary flight hours and experience often become corporate or airline pilots, but some remain in the teaching field. If they attain certain high standards, they can qualify for the Federal Aviation Administration's "Gold Seal," which identifies them as superior teachers and can lead to higher salaries. When the number of students is large enough, a flight instructor can organize a flying school, directing the activities of other instructors.

### *Outlook for the Future*

General aviation is experiencing little or no growth in the number of people who want to learn to fly. When economic conditions are uncertain or poor, aviation is one of the first industries to suffer. The recent recession combined with elimination of the G.I. Bill Flight Training Benefits has had a detrimental effect on civilian pilot training. In the long run, today's general aviation fleet of approximately 220,000 aircraft is expected to increase to 315,000, creating a demand for more pilots and increased opportunity for flight instructors.

## CORPORATE PILOT

### *Nature of the Work*

Corporate pilots fly aircraft owned by business and industrial firms. They transport company executives on cross-country flights to branch plants and business conferences. They arrange for in-flight passenger meals and ground transportation at destinations, and they are responsible for supervising the servicing and maintenance of the aircraft and keeping aircraft records.

### *Working Conditions*

The job is often challenging. Corporate pilots are expected to fly to many unfamiliar airports and in all kinds of weather. The aircraft may be a light twin-engine plane, a small executive jet, or even an airline-type plane. At the call of company executives, the pilot may have to work irregular hours. Often the pilot is away from home overnight. (Studies show that a significant percentage of round trips are over 1,000 miles.) If the company owns a fleet of planes, pilots may fly a regular schedule. Compared with the airline pilot's flying assignments, those of the corporate pilot are far from routine.

### *Opportunities for Advancement*

A corporate pilot can acquire enough flight experience and skill on the job to qualify as first officer (co-pilot) on an airline. If the pilot prefers to remain in general aviation and the firm has a fleet of aircraft, he or she may eventually move up to the position of chief pilot, directing all of the company's aircraft operations.

### *Outlook for the Future*

Studies of the growth of the business aircraft fleet indicate that more and more corporations will acquiring aircraft in the years ahead. Over 500 of the top 1,000 companies in the United States have active flight departments. Aircraft especially designed for business use offer business executives advantages over airline travel in terms of time saving, privacy, flexibility of schedules, and comfort. More than 50,000 company-owned planes were used in 1990. Business aircraft that year represented about 23 percent of all general aviation; however, they did approximately 75 percent of the general flying. General aviation activity amounted to 76 percent of the total aircraft operations at airports with FAA airport traffic control towers. To operate this expanding fleet will require about 1,500 new pilots each year, not including additional pilots to replace those who retire, transfer, or who are removed for other reasons. Companies are expected to be in competition with the airlines in the hiring of qualified pilots, most of whom will be instrument rated.

## AIR TAXI OR CHARTER PILOT

### *Nature of the Work*

The air taxi or charter pilot flies fare-paying passengers "anywhere—any time" but usually for short trips over varying routes in single-engine or light twin-engine planes.

### *Working Conditions*

These pilots fly passengers and cargo as service demands, but normally in daylight hours if the aircraft is a single-engine plane. Flights are mostly of short dura-

tion, and pilots can count on returning home at the end of the working day. If employed by a company with a fleet of aircraft, the pilot may fly on regular schedules over the same routes, much like a small airline. Pilots may be required to wear a uniform when on duty.

### *Where the Jobs Are*

Air taxi operators are located at major airports and at other airports where sufficient passenger traffic can be generated. Interline agreements with airlines account for a substantial part of air taxi business; therefore, operators are frequently located at airports having airline service.

### *Opportunities for Advancement*

Like the flight instructor, the air taxi pilot can build up enough flight experience in a relatively short time to qualify for the position of corporate pilot or air transport copilot. If the pilot elects to remain in the air taxi and charter business, he or she may generate enough business to offer "commuter airline service" or scheduled service over specified routes similar to those flown by a small airline.

### *Outlook for the Future*

Air taxi and commuter operators claim the fastest rate of growth among all segments of general aviation. This growth reflects the increase in airline travel and the greater use of air taxis to "fly all the way" from any of the more than 600 airports served by the airlines to the remaining 17,000 airports in communities without airline service. Many airlines have agreements with air taxi companies to promote the use of air taxi service to airports not served by the airline and to issue "through" tickets. Many air travelers, anxious to bypass crowded metropolitan streets, use air taxis rather than rented cars to reach destinations in outlying areas. Since 1978 when Congress passed the Airline Deregulation Act, the air taxi and commuter industry has grown rapidly. As the major airlines abandon unprofitable route segments, air taxi and commuter services move in to continue the necessary air service. The U.S. Postal Service contracts with air taxi operators to deliver mail, and this will further increase scheduled air taxi business. Given the present rate of expansion in this field, the need for air taxi and commuter pilots will continue to grow significantly.

## COMMERCIAL AIRPLANE OR HELICOPTER PILOT

### *Nature of the Work*

The commercial airplane or helicopter pilot performs a wide variety of jobs: aerial photography, aerial advertising, sightseeing, geological survey, fish and game census, or checking federal airways and navigational aids. Helicopter pilots may fly workers and supplies to offshore oil rigs on a regular schedule. Or they may respond to emergencies—flying accident victims to a hospital heliport, or rescuing people stranded by floods. Another mission is to lift heavy loads to tops of buildings or to remote mountain sites. In addition, there are career opportunities for pilots in the fields of law enforcement, fire fighting, and TV and radio traffic reporting.

### *Working Conditions*

Flights are usually of short duration. The pilot usually works for an operator whose services are chartered. Helicopter pilots are often required to do precision flying, hovering over a particular spot or landing on small cleared areas.

### *Where the Jobs Are*

The use of general aviation aircraft and helicopters is widespread throughout the United States. Pilots are employed just about everywhere there are airports or heliports.

### *Opportunities for Advancement*

Commercial airplane or helicopter pilots can aspire to advanced status as they build up hours of flying experience and skills. If they work for an operator who owns a fleet of aircraft or helicopters, they may advance to the job of chief pilot, or they may build up enough business to employ other pilots and direct their operations.

### *Outlook for the Future*

Considering variables in the economy, the cost of fuel, and aircraft production, the outlook for the short term is mixed. Studies do indicate that for the long term, the need for pilots will grow as more pilots retire and the demand for aviation benefits expands.

## PATROL PILOT

### *Nature of the Work*

The patrol pilot flies crosscountry at low altitudes along pipelines or power lines, checking for signs of damage, vandalism, and other conditions requiring repairs. Patrol pilots radio to headquarters the location and nature of repair jobs.

### *Working Conditions*

The pilot flies light aircraft over all kinds of terrain, frequently at low level. He or she usually works for an operator who contracts with an oil pipeline or electric power company to furnish aerial patrol service.

### *Where the Jobs Are*

Patrol pilots fly wherever there are electrical power transmission lines or oil and gas pipelines. Many power transmission lines run through mountainous regions where water sources and dams produce electrical power. Oil and gas pipelines spread out in underground networks from oil and gas fields, many of which are located in midwestern and southern states. Some pilots are employed by the U.S. Immigration Service to patrol the international borders.

## FERRY PILOT

### *Nature of the Work*

The ferry pilot flies new aircraft from the manufacturing plant to dealers' showrooms and to private customers' home airports.

### *Working Conditions*

After delivering new aircraft to customers and dealers, the pilot returns to his or her home base, usually by commercial airliner. The pilot may be away from home overnight, depending on the distance required by the ferry flight. Some pilots specialize in transoceanic ferry flights to foreign countries. This requires a knowledge of the installation and use of auxiliary ferry fuel tanks and specialized radio-navigation equipment, as well as a familiarity with foreign regulations.

### *Where the Jobs Are*

The ferry pilot may be employed by an aircraft manufacturer, many of which are located in Kansas, Oklahoma, Florida, and Pennsylvania. Alternatively, the pilot might work as an independent contractor for a ferry service or a fixed base operator in just about any part of the United States.

### *Outlook for the Future*

The production of general aviation aircraft has decreased from 17,000 in 1978 to fewer than 1,200 in 1988. This drastic reduction has significantly lessened the need for ferry pilots to deliver new aircraft. The market for used aircraft has increased demand somewhat, but it is still quite low.

## AGRICULTURAL PILOT (Aerial Applicator)

### *Nature of the Work*

The agricultural pilot flies specially designed aircraft (including helicopters) to apply herbicides, insecticides, seeds, and fertilizers on crops, orchards, forests, fields, and swamps. Some jobs require aerial surveys of cattle and crops or fighting forest fires by dumping fire retardant materials.

### *Working Conditions*

Agricultural pilots carry heavy loads at low levels. They fly in a regular pattern over the ground and watch out for trees, power lines, fences and other obstacles. Most flying is done during the early hours of the morning and again in early evening when the air is still. Takeoffs are often made from country roads and open fields close to the area to be treated. Work is seasonal, ranging from six to nine months in southern areas to two months in northern sections. The operator usually furnishes the aircraft, trained ground crews, and specialists who decide how the land is to be treated. The pilot works very close to poisonous liquids and chemicals and must wear protective clothing and masks.

### *Where the Jobs Are*

Agricultural pilots are in demand mostly in California and in the southern tier of states where the crop-growing season is longest. Many pilots follow the crops north as the season progresses, while others find work in northeastern and western states with extensive forest areas.

### *Outlook For the Future*

The approximately 3,300 agricultural operators in the United States employ more than 25,000 people, operate some 9,000 aircraft, and make applications to more than 180 million acres of farmland each year. Experienced agricultural pilots continue to be needed.

## TEST PILOT

### *Nature of the Work*

Experimental or engineering test pilots fly newly designed and experimental aircraft to determine if the plane operates according to design standards and make suggestions for improvements. Production test pilots fly new planes as they come off assembly lines to make sure they are airworthy and ready to turn over to customers. Airline test pilots flight test airliners after major overhauls before the planes are put back into service. They also flight test new aircraft to be sure they are up to airline standards before the airline accepts them from the manufacturer. Test pilots for the FAA fly planes with experimental equipment aboard to test performance of the equipment, or they fly FAA planes to check the performance of ground-based navigational aids, radar, and runway lighting.

### *Working Conditions*

The experimental test pilot must expect the unexpected. The plane is tested to the limits of its design strength and performance capabilities. Test pilots sometimes encounter emergencies, which they are expected to handle with skill and knowledge. They prepare written and oral reports on their flight experiences and may fly during either the day or at night. Airline test pilots often work at night or on weekends, since that is when most aircraft are serviced.

### *Where the Jobs Are*

Experimental and production test pilots are employed at all aircraft manufacturing plants, which are located mainly in California, Washington, Kansas, Texas, Georgia, Oklahoma, Maryland, Missouri, Florida, New York, Pennsylvania, and Connecticut. Airline test pilots work wherever the airlines have overhaul bases. The largest bases are in San Francisco, Miami, New York, Tulsa, and Kansas City.

### *Opportunities for Advancement*

Engineering and production test pilots may advance to the position of chief test pilot. Airline test pilots eventually may advance to the airline's engineering or maintenance administrative staff.

### *Outlook For the Future*

The demand for engineering and production test pilots will fluctuate with the development and production of aircraft. Over the next decade the production of aircraft is expected to increase.

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