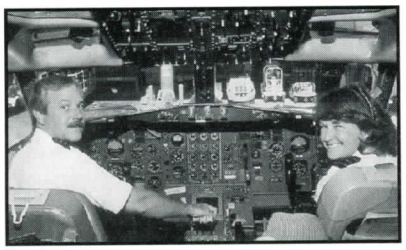
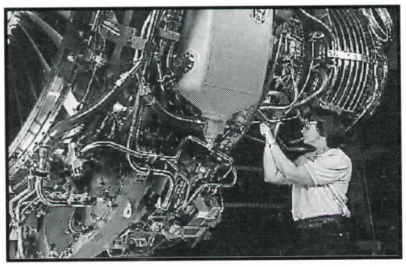
U.S. Department
of Transportation

**Federal Aviation
Administration**

Aviation Careers:
THE SKY'S THE LIMIT





Includes:
Pilots & Flight Engineers
Flight Attendants
Airline Non-Flying Careers
Aircraft Manufacturing
Aviation Maintenance & Avionics
Airport Careers
Government Careers
Women in Aviation

Federal Aviation Administration
Aviation Education Program

AE-95-06

FEDERAL AVIATION ADMINISTRATION
AVIATION EDUCATION POLICY STATEMENT

The Federal Aviation Administration (FAA) has a rich history of dedication and commitment to aviation education. Congress has recognized FAA's leadership role by mandating the establishment of a national aviation education program to be implemented in cooperation with all FAA's regions.

Because FAA's aviation education program is central to the agency's mission of maintaining America's preeminence in world aviation, it shall be the policy of FAA to enhance our leadership position by creating aviation education programs that promote and support the growth of aviation through public education. It shall be a high priority to re-engineer FAA's aviation education programs and institutionalizing them through linking with FAA's strategic plan initiatives.

The FAA will support the President's Goals 2000: Educate America through continuing cooperation with other Federal, State, and local governments, the aviation industry, and the education community. FAA will continue to nurture partnerships--both domestically and internationally--as a means of leveraging our resources, enhancing our aviation networks, and educating our fellow citizens.

I am committed to strengthening America's competitiveness through quality aviation education programs that serve the needs of our diverse citizenry and contribute to the building of the economic infrastructure of our Nation's communities.

David R. Hinson
Administrator

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.

The Federal Aviation Administration (FAA), 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.

For someone who is looking for a career that offers a tradition of service, growth, and excitement, the world of aviation beckons. It's a big world, and one that is made up of a wide variety of job opportunities. Some require a considerable amount of training, while others are available at the entry level.

Depending on the kind of working environment you prefer, you may find yourself aloft in the cockpit or cabin of a plane or on solid ground in an office, on a production line, or on an airport ramp.

This brochure will provide you information on the various career opportunities within the field of aviation including general information of each career unit, an in depth description of the nature of work to be performed, working conditions, locations of jobs, opportunities for advancement, outlook for the future, training needed for the position, wages and benefits for each career opportunity listed. Also, it will highlight a variety of diverse and successful women who pursued and accomplished their mission in having a career in the field of air transportation.

The career series which this publication includes are:

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***
8. ***Women in Aviation***

If you would like more information on which post-secondary institutions offer specific courses needed to accomplish your individual career goals, scholarship/grant information, contact names of each college, write to the Government Printing Office, Washington, DC 20402, and request the publication entitled "Transportation Education Directory Guide."

ACKNOWLEDGMENTS

The FAA wishes to thank Keith Connes for his contributions to this publication.

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Aviation Career

PILOTS & FLIGHT ENGINEERS

Aviation Career - 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. A flight engineer 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.

In earlier days of flying, pilot's jobs went almost exclusively to men. This is no longer true, and many airlines and other segments of the aviation industry are actively recruiting women as well as minorities, for pilot positions.

The more flying hours and flying skills a pilot has, the more opportunities there are 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. Sometimes a relatively low-time pilot can increase his or her chances of getting an airline job by taking an "airline transition course" at a qualified flight training academy. The cost of the training ranges from $9,000 to $15,000 and may be borne by the applicant, depending on job market conditions.

The best-paying jobs are at the major airlines. Starting pay, often as a flight engineer, averages $24,000 a year, increasing to $75,000 as first officer after five years, and then to $135,000 as a new captain after 10 years. A senior captain's pay can exceed $200,000. Regional airlines pay much less, with starting salaries for a first officer as low as $12,000 and captain's pay starting at about $35,000 and increasing over the years to a maximum of about $70,000.

AIRLINE CAPTAIN

Nature of the Work

The airline captain bears the ultimate responsibility for each flight they conduct. The captain plans each flight with the airline's flight dispatcher and meteorologist; together 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 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.

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 position of flight engineer exists on aircraft requiring a 3-person crew. It should be noted that the newer airliners have been designed for 2-person crews and thus do not require a flight engineer. As a result, the need for flight engineers is declining and will continue to do so. The airlines that continue to need flight engineers often place new-hire pilots in that position; after a time they will transition to flying jobs as first officers. Those not qualified as pilots are considered to be "career flight engineers."

The flight engineer conducts walks around the aircraft to check approximately 200 items. A flight engineer also 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.

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

Most, if not all, of the major airlines are members of the Air Transport Association. The ATA offers a brochure entitled "People of the Airlines" that lists the names, addresses, and phone numbers of its member airlines. You can request a free copy of this brochure from the Public Information Department, Air Transport Association, 1709 New York Avenue N.W., Washington, DC 20006.

Listings of the regional airlines are more difficult to obtain. You can probably locate those regionals serving your own area by consulting the telephone directory yellow pages. Extensive information and airline career assistance are provided, for a membership fee, by two organizations: Future Aviation Professionals of America (FAPA), 4959 Massachusetts Boulevard, Atlanta, GA 30337, 1-800-JET-JOBS (1-800-538-5267), ext 190; and AIR, Inc., 201 Smokerise Trace, Peachtree City, GA 30269, 1-800-AIR-APPS (1-800-247-2777.

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.

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 long-term future. On the positive side, an estimated 60 to 70 percent of the current airline pilot work force will retire during the next decade as they reach the mandatory retirement age of 60. Depending on the source of information, estimates of the number of pilots that will be needed by the year 2004 ranges from 35,000 to 58,000. The more conservative estimates are based on the expectation that, although airline travel will continue to increase over the years, the pilot jobs will not expand at the same rate, due to more efficient scheduling of aircraft.

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. The pilot 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, multi-engine 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. Income varies according to regional economic conditions. Hourly pay is from about $9 to $12 an hour, with yearly earnings ranging from $12,000 to $17,000.

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 around. 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 $9 to $12 an hour and gross only $12,000 to $17,000 a year. Rates of pay vary according to regional economic conditions.

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 businesses and industrial firms. They transport company executives on cross-country flights to branch plants, business conferences and out-of-town meetings. 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. Starting pay is as low as $12,000 a year, rising to a median range of about $20,000 to $50,000 for first officer and $38,000 to $70,000 for captain. Salaries are often dependent on the type of aircraft flown. Top pay for a senior captain flying a heavy jet can be as high as $120,000.

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. The pilot may prefer to remain in general aviation. If the firm has a fleet of aircraft, the corpporate pilot 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 acquire 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 duration, 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 they can generate sufficient passenger traffic. Inter-airline agreements 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 co-pilot. The pilot may elect to remain in the air taxi and charter business. The pilot 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 US 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 cross-country 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. A patrol pilot 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. Additionally, the US Immigration Service employs pilots 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 maybe 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 17,878 in 1978 to 850 in 1993. This drastic reduction has significantly lessened the need for ferry pilots to deliver new aircraft. The market for used aircraft has sustained the 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. They often make takeoffs 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.

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 turbo-prop 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 fly-experience. 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

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***
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.

U.S. Department
of Transportation

**Federal Aviation
Administration**

Aviation Career

FLIGHT ATTENDANTS

Aviation Career — Flight Attendants

GENERAL INFORMATION

While the flight crew in the cockpit is responsible for getting the passengers to their destination safely and comfortably, the flight attendants are in charge of the cabin, and they, too, are responsible for the safety and comfort of the passengers.

The flight attendant's normal routine is to see that the passengers are seated properly and to serve refreshments or meals during the flight. The attendants are also trained to handle emergencies, and over the years many of them have honored their profession with heroic service.

Flight assignments usually require overnight stays in cities away from home base. In these cases, hotel, transportation, and meal expenses are paid by the airline.

Although most flight attendants hired by US airlines are women, men are hired as well. There are job opportunities for married and single persons, and older as well as young people. The duties and working conditions for men and women flight attendants are identical.

Nature of the Work

The chief responsibility of a flight attendant is to ensure safety of the passengers and their evacuation in case of emergency. Routine duties are as follows:

A. Preflight Duties

1. Attends preflight briefings by the captain to learn about expected weather conditions, special passenger problems, etc.
2. Checks passenger cabin and galleys before passengers board to see that all supplies, safety equipment, and food are on board and in place.
3. Greets and directs passengers to their seats; assists passengers with young children and the elderly or handicapped.
4. Helps passengers stow hand luggage and coats.
5. Checks seat belts and observance of "No Smoking" signs.
6. Makes announcements over public address system regarding weather, altitude, estimated flight time, etc.
7. Demonstrates use of safety equipment.

B. Inflight Duties

1. Distributes reading materials, pillows, and blankets to passengers who request them.
2. Serves refreshments and meals to passengers and crew.
3. Gives first aid to uncomfortable or ill passengers.
4. Answers passengers' questions and reassures apprehensive travelers.
5. Takes special care of unaccompanied children.
6. Makes landing announcements and checks to make sure cabin is secure for landing.

C. Postflight Duties

1. Writes reports on minor medication given to passengers, lost and found articles, cabin and equipment needing attention and numerous other matters that may need to be reported.
2. If required by the airline, performs tidying chores such as folding blankets, wiping off the buffets, and straightening curtains.

In addition to performing flight duties, flight attendants sometimes make public relations appearances for the airlines during "career days" at high schools, at United Givers Fund campaigns, and at sales meetings, conventions, and other goodwill occasions.

Working Conditions

Flight attendants spend most of their time in the passenger cabin of an airliner. They fly from 75 to 85 hours a month. In addition to flight time, they have about 50 hours a month duty time between flights, and they must be present for check-in to crew scheduling and briefing at least an hour before flight time. At the end of the flight, the flight attendant may have reports to complete. In most cases, agreements between the airline and the union determine the total monthly working time.

The hours in a flight attendant's working day are irregular and are determined by the flight assignment. If the flight leaves at 5 A.M., the flight attendant is expected to report to the captain by 4 A.M. The maximum number of flying hours per day is also set by union agreements and government regulations.

Over a year's time, each flight attendant averages about 156 days off, not counting partial days off before and after trips. (The average office worker has 96 days off and, works eight-hour days.) Flight attendants frequently work at night and on weekends and holidays. They may bid for flights, but the final assignment is determined by seniority.

Flight attendants are required to buy uniforms and to wear them while on duty. Uniform replacement items are usually paid for by the airline. The uniform is made to measure and is designed by top names in the fashion world to look like a coordinated high-style ensemble rather than a work-a-day uniform. Usually the airline gives flight attendants a small monthly allowance to cover cleaning and mending.

Inflight duties keep flight attendants on their feet most of the time. To accomplish all their tasks during the few hours in the air, flight attendants frequently must work at top speed. At times, they must serve meals and pour beverages under rough and uncomfortable flying conditions. (No hot beverages are served in turbulent air.) They must be pleasant to all kinds of people, some of whom can be annoying and demanding.

Depending upon seniority, the flight attendant may be directed by a senior flight attendant or may direct the work of a junior flight attendant. Flight attendants may provide elaborate service to a small number of first-class passengers or less elaborate but substantial service to a larger number of tourist-class passengers.

Where the Jobs Are

Flight attendants are employed by every airline and are based, or "domiciled," at major cities along the airline's routes and at the airline's headquarters city. In general, flight attendants work out of major airline centers such as New York, Los Angeles, Miami, Chicago, San Francisco, Denver, Atlanta, Boston, Kansas City, Detroit, Seattle, Dallas/Fort Worth, and Washington, DC.

Wages and Benefits

Usually a guaranteed monthly salary is paid for a minimum number of base hours ranging from 67 to 85, depending upon union agreements. For every hour flown above the minimum guarantee, extra incentive payments are made on an hourly basis. Flight attendants on international flights customarily mean higher salaries than those on domestic flights.

Flight attendants earn about $12,000 to $14,000 annually to start, with small increases during the first five years of employment. Those with six years of flying experience have median annual earnings of approximately $27,000, while some senior flight attendants are paid $35,000 to $50,000 a year. Flight attendants receive extra compensation for overtime, and for night and international flights.

A flight attendant has the same benefits as other airline employees, such as paid vacation, paid sick leave, paid medical insurance and life insurance, retirement benefits, free or greatly reduced air travel expenses for self and immediate family, and credit union membership. With the time and low air fares at their disposal, flight attendants can afford to vacation almost anywhere in the world.

The majority of flight attendants are represented by one of the following unions: Association of Flight Attendants, Teamsters, or Air Transport Division of the Transport Workers Union of America. Several airlines have company unions (such as the Association of Professional Flight Attendants).

Opportunities for Advancement

If they successfully complete the training course, new flight attendants begin work on a probation basis for six months. During this time, they are on call to work on extra flights or as replacements for flight attendants who are ill or on vacation. Their work is periodically observed by the airline's management staff. If the probation period review is favorable, the new flight attendant can advance in time to become a senior flight attendant, supervising flight attendant, or an instructor.

Flight attendants also may be considered for positions in reservations or ticket sales, public relations, or personnel recruiting, depending upon qualifications for these positions. Their experience qualifies them for numerous jobs involving contact with the public. Fewer flight attendants, however, are changing jobs. The past average tenure of two years is now more than seven years and increasing. The flight attendant job is now being viewed as a profession for career-minded individuals.

Requirements to Enter the Job

A. Physical: Applicants usually must be at least 19 to 20 years old, although some airlines have higher minimum age requirements. Flight attendants must be in excellent health and be able to speak clearly. They should have an attractive appearance, good personal hygiene, and a height of at least 5' 2" in order to reach overhead bins. Weight should be in proportion to height. Vision may be corrected with eyeglasses or contact lenses.

B. Personality: Applicants must be poised, mature, emotionally stable, outgoing, and good conversationalists.

C. Marital Status: Married men and women with children are eligible, as are those who are single, widowed, or divorced.

D. Education: Applicants must be high school graduates, but persons with several years of college or experience in dealing with the public are preferred.

E. Other: Applicants who desire to fly interna-

You have to know how to evacuate an airplane under many different conditions, and you go through all the scenarios that might be countered in an emergency. We are taught first aid.

Once a year we have to go through recurrent training and learn anything new that's come out. It's sad to say, but every time an airplane crashes we learn a lot from it. Also, we have to practice emergency procedures, including a mock exercise in evacuating an airplane. You get into the simulator and go to your exit and sometimes the exit will be blocked by fire and you have to know what to do in that situation.

After the TWA incident in Beirut, we were required to go through eight hours of hijack training because the government and the airlines felt the crews needed more background in that area.

In order to make an informed choice as to an airline career, I would most definitely research the airline that I was giving my application to. The airlines can be selective, but you can be selective, too. Contact the FAA or the Department of Transportation and try to find out if the airline of your choice is financially stable and has a good operating record.

Apply to several airlines; don't put all your eggs into one basket. I think it's very important to realize that it's a transient job, especially with mergers and acquisitions and the way that the airline industry is growing. But you have to be flexible. That' s the name of the game. You might be told one day—or you might just pick up a newspaper and find out—that your airline was bought by somebody else, which more than likely means you'll have a move on your hands. You have to go to where the flying is.

You have to realize that it's not all a glamour job. You do get to work with the public and you can get a lot of fulfillment by the things you do for your passengers, but it's hard and tedious work, and it's very uncertain these days.

U.S. Department
of Transportation

**Federal Aviation
Administration**

Aviation Career

AIRLINE NON-FLYING CAREERS

Aviation Career - Airline Non-Flying Careers

GENERAL INFORMATION

The airline industry is a dynamic industry indeed. It has become the major provider of public transportation for Americans traveling between the nation's cities. In fact, scheduled airlines now account for 92 percent of public passenger intercity travel. Career opportunities with the airlines vary widely. For some jobs, a small amount of training is needed; for others, college degrees are required. In between these extremes are dozens of jobs calling for different types of education, skills, and personal characteristics. The working conditions, wages, opportunities for advancement, and requirements for entry are briefly described on the following pages. Information about airline pilots, flight engineers, flight attendants, and aviation mechanics is omitted since these positions are discussed in other sections of this document.

Salaries, working conditions, and opportunities for advancement vary according to the size of the airline. The larger the airline, the greater the opportunities and the stiffer the competition. Scheduled airlines of the United States range in size from those with two stations and fewer than 50 employees to those with over 100 locations and more than 40,000 employees.

US international airlines fly to foreign airports throughout the world; major domestic carriers span the continent, connecting large population centers. A number of these major airlines also fly over international waters to Alaska, Hawaii, and the Caribbean. In recent years the number of regional airlines with service to small communities has expanded. Then there are the all-cargo airlines, some of which provide overnight delivery of letters and packages.

In general, most airline jobs require a high school diploma. All workers, regardless of their jobs, receive on-the-job training. Some private technical schools offer courses in airline operations such as reservations, ticketing, teletyping, and flight attendant work. This training may give an applicant an advantage, but, the airlines have their own training procedures, so interested applicants should check with the airline of their choice to see what pre-employment training is required.

The airline industry updates its equipment and working methods periodically, which makes it necessary for personnel to be retrained from time to time. Few industries are so involved with employee training programs. The airline industry gives employees new skills at the company's expense and keeps them abreast of new equipment techniques. Whether the job is that of a pilot, mechanic, flight attendant, baggage handler, ticket sales agent, or a manager, periodic training is mandatory. These large training programs provide opportunities for employees to advance to jobs on training staffs.

Employees enjoy benefits such as paid vacation, sick leave, life insurance, dental insurance, group accident and sickness insurance, retirement income plans, credit union membership for savings and loan purposes, and free air travel or air travel at greatly reduced rates for employees and members of their families. In addition, they often receive large discounts for travel on international airlines and for hotel accommodations at holiday destinations. Employee suggestion programs with cash awards are another benefit.

Promotions are almost always made from within the company. Usually vacancies are filled by advancing the best-qualified workers from the ranks. Merit promotions are made periodically on the basis of the employees' work. Shift work is a characteristic of many jobs with the airlines; passengers and cargo travel all hours of the day and night, and passenger and air cargo services must be available. Dissatisfaction with shift work is the most common cause of job turnover, even though hourly wages are increased for workers on afternoon and evening shifts. Smoking on the job is prohibited for those who deal with the public or those who clean, fuel, or overhaul the aircraft.

All personnel who have direct contact with the public or who need special clothing for utility or sanitary reasons (cleaners, mechanics, and kitchen workers) must wear uniforms. Employees are usually required to purchase their own uniforms; this requirement reduces the amount of personal clothing for working hours that is needed.

Airline jobs are located in every city that airlines serve and even in a few they do not serve. Of course, the larger the city, the greater the variety of job opportunities. The largest concentrations of airline career opportunities are in New York, Chicago, St. Louis, Los Angeles, San Francisco, Miami, Detroit, Denver, Kansas City, Atlanta, Boston, Cleveland, Salt Lake City, Seattle, and Washington, DC. An applicant may obtain career information by writing directly to the airline. Foreign airlines flying into the United States hire Americans to handle their passenger and air cargo business and to service their aircraft during stopovers. These employment opportunities should not be overlooked.

The airline industry is a young industry, and it attracts youth. Morale is generally high among employees, who

seem to develop a high degree of loyalty to their company and to the airline industry. (There are exceptions. After buyouts and mergers, employees often feel that the incoming management has disregarded their needs.) Jobs with the airlines tend to carry an aura of prestige in the community, reflecting the vitality of technological progress and the romance and excitement associated with air travel and faraway places.

FLIGHT DISPATCHER

Nature of the Work

In cooperation with the pilot, the flight dispatcher furnishes a flight plan that enables the aircraft to arrive at its destination on schedule with the maximum payload and the least operating cost. The flight dispatcher considers enroute and destination weather, winds aloft, alternate destinations, fuel required, altitudes, and traffic flow. The dispatcher's signature, along with that of the pilot, releases the aircraft for flight. The dispatcher maintains a constant watch on all flights dispatched and is the go-between for the pilot and ground service personnel. A flight dispatcher keeps all personnel concerned with the flight informed about its status. The dispatcher must be familiar with navigation facilities over airline routes and at airports as well as with the takeoff, cruising, and landing characteristics of all aircraft operated by the airline. The flight dispatcher also must ride periodically in the cockpit with the flight crew to observe flight routes, conditions, and airports.

Working Conditions

Flight dispatchers work indoors at the airport in the airline operations office. They use computers, calculators, weather charts and information, and loading reports. A 40-hour week with shift work is normal.

Flight dispatchers frequently work under pressure, especially when flying weather is bad. They must make many rapid decisions concerning safety, flight regulations, and the economy of operations. These employees are surrounded by people, teletype machines, telephones, and intercom systems in a noisy, busy atmosphere. Those who work for a small airline, carry on the duties of a meteorologist and schedule coordinator.

Wages

Salaries start around $25,000 per year and increase, over a ten-year employment period, to about $50,000.

Opportunities for Advancement

Flight dispatchers can move into this position from jobs as dispatch clerks, junior flight dispatchers, radio operators, meteorologists, or station managers. Large airlines employ senior dispatchers who specialize in coordinating the finances of every flight. Promotion is from within. Experience as an airline dispatcher may be used in qualifying for a job as an air traffic controller with the Federal Aviation Administration or as an airport director.

Requirements for the Job

Though a college degree with a major in air transportation or meteorology is useful preparation for work as a flight dispatcher, experience is equally important. Job applicants must have good vision, hearing, enunciation, and an FAA dispatcher's license. They must know thoroughly the Federal Aviation Regulations on airline operations and be competent in airline communications and meteorology.

METEOROLOGIST

Nature of the Work

The meteorologist analyzes weather data and prepares weather reports for the flight dispatcher, pilots, and other airline personnel concerned with weather information. The meteorologist assists the flight dispatcher in preparing flight plans.

Working Conditions

Working indoors at the airport in the airline operations office, the meteorologist uses weather facsimile machines, teletype machines, computer terminals, weather charts, and other meteorological data. Shift work is required, and the normal work week is 40 hours.

Wages

Airlines, depending upon their size, pay between $28,000 and $47,000 per year as a starting wage. For meteorologists employed by the Federal Government, those with a bachelor's degree but no experience receive starting salaries ranging from $ 17,000 to $22,000, depending on college performance. For master's degrees, starting wages range from $21,000 to $27,300 and Ph.D. from $25,700 to $33,400.

Opportunities for Advancement

A meteorologist with a large airline may be promoted to chief meteorologist or take a position as an assistant flight dispatcher. The employee may also use this experience to become a meteorologist for the National Weather Service or for a private meteorology service.

Requirements for the Job

A college degree with a major in meteorology is required. It is common to gain prior experience with military weather services or with the National Weather Service as a meteorological technician or meteorologist.

SCHEDULE COORDINATOR

Nature of the Work

The schedule coordinator keeps track of the whereabouts of aircraft and crews; receives and relays reports of delays due to weather and mechanical problems; gives orders for substitution of aircraft when required, and handles the scheduling problems that arise when flights must be diverted to alternate airports. The schedule coordinator makes decisions affecting the seating arrangements of planes, turnarounds, estimated times of arrival, and unscheduled stops. A schedule coordinator also determines aircraft availability, based on servicing and maintenance requirements. In scheduling crews, the schedule coordinator must consider many factors: sick calls, vacations, days off, flight hour limits, types of aircraft for which a crew is trained, and seniority bids or choices of flights selected by crew members.

Working Conditions

The airline operations office at the airport is a very busy place. The schedule coordinator is surrounded by banks of phones, teletype machines, computers, and charts. The pressure of the job can be intense. A 40-hour work week, with shift work, is normal.

Wages

Annual wages range from about $15,000 to $38,000, depending upon the size of the airline.

Opportunities for Advancement

The schedule coordinator, after starting as a clerk with responsibilities in one or two areas, can advance to assistant schedule coordinator, senior schedule coordinator, and then chief of schedule control. Promotion to a position in the dispatcher's office as general dispatch clerk or an operations planner is also possible.

Requirements for the Job

A college degree with a major in air transport operations is useful preparation, but it is not mandatory.

STATION MANAGER OR AGENT (District Operations Manager)

Nature of the Work

The station manager or agent is responsible for all flight and ground operations such as aircraft handling, passenger services, and air cargo operations for the airline at a particular airport. At a small station, the manager may be required to sell tickets, make public announcements, check baggage, move portable stairs, prepare passenger and air cargo manifests, operate teletype machines and computer terminals, and perform other services.

Working Conditions

Usually the station manager works in an office at the airport. Occasionally, the station manager may work outdoors, depending upon the size of the airport and the staff. Shift work is required during a 40-hour week.

Wages

Annual wages start at about $13,000 per year and increase to about $33,000 after 10 years, depending upon the size of the airline.

RESERVATIONS SALES AGENT

Nature of the Work

Each year millions of Americans travel by air. Their trips are made easier by professionally trained reservation sales agents. They handle telephone inquiries about flight schedules, fares, and connecting flights; reserve seats and cargo space for customers; operate computerized reservations equipment; and keep records of reservations. Agents must be able to recommend services that fit each customer's requirements, and they must be familiar with routes and schedules of other airlines.

Working Conditions

Reservation agents usually work in large central offices answering customers' telephone inquiries and booking flights. Most agents have access to computer terminals and, by typing instructions on the keyboard, can quickly obtain the necessary information and make the reservation.

The transportation industry operates at all hours of the day and night, thus schedules are often irregular. Agents with the least seniority often work nights, weekends, and holidays. Although the work is not physically strenuous, some employees may feel stress, especially during busy periods of holiday travel or at times when the computer

systems fail. If operations are interrupted or delayed due to inclement weather or mechanical problems, agents may serve as buffers between the airlines and their customers. Trying to pacify angry travelers also can create stress. The job, however, is interesting, and many challenges occur as the reservations sales agent works out the passenger's travel requirements.

Wages

Some 54,000 reservations sales agents work for the airlines, with starting salaries at about $13,000 going up to around $40,000 for supervisors.

Opportunities for Advancement

A reservations sales agent may advance to training or supervisory positions. Supervisors monitor how other agents handle customers' inquiries. The handling of "executive accounts" and the accounts of firms with special "vacation packages" offered by the airline are jobs reserved for the more experienced and higher paid agents. The employee may transfer to a job of ticket agent. Reservations work is a principal route to a management position for the persistent worker since turnover, due to shift work, is high. Promotion opportunities are frequent.

Requirements for the Job

Applicants must have graduated from high school and be at least 18 to 20 years of age, depending on the airline. One or two years of training in airline operations at schools offering such courses, or experience in public telephone contact work, is preferred. Airlines offer on-the-job training. Accuracy and speed on the job are essential. A good telephone voice, proper English usage, and the ability to "project" oneself over the phone are necessary. Today experience with computers and computer programs specifically geared to reservations is often required. At least one year of prior experience in public relations work, preferably in sales, is needed. College may be considered as a substitute for prior work experience. Applicants must be willing to work shifts. Air cargo reservations agents may need some experience in shipping operations.

TICKET AGENT

Nature of the Work

The ticket agent answers inquiries about flight schedules and fares, verifies reservations by phone, figures fares, writes tickets, and handles payments. Other duties may include checking baggage, making boarding announcements, and assisting handicapped passengers when they board or depart the plane. Telephone and computer equipment are used.

Working Conditions

The agent may work at an airport or at an airline ticket office downtown or in a hotel. Shift work is necessary, and most airlines require ticket agents to wear uniforms.

Wages

Wages range from $19,200 to $32,400 per year, plus additional pay for late shift work.

Opportunities for Advancement

A ticket agent may be promoted to passenger service agent, station agent, or chief of the ticket office. Promotion to ticketing instructor, or joining the airline staff as a sales representative are also possible. Superior employees are often considered for junior management training.

Requirements for the Job

The minimum age varies from 18 to 20 years, depending on the airline. Graduation from high school is a minimum requirement; however, two years of college or the equivalent experience in dealing with the public is preferred. Good grooming, respect for accuracy, a pleasant and courteous manner, and legible handwriting are important. International airlines may require foreign language ability. On-the job training is offered.

GROUND ATTENDANT

Nature of the Work

The ground attendant assists passengers in the terminal with their questions about fares, lost baggage, missed connections, and other problems. Passengers who are ill or need a wheelchair are helped by the ground attendant. High public visibility characterizes the job.

Working Conditions

The work involves considerable standing and walking inside the air terminal. Shift work is required, and a uniform must be worn.

Wages

Wages range from $19,200 to $33,600 per year.

Opportunities for Advancement

A ground attendant may advance to trainer, supervisor, or chief of counter sales.

Requirements for the Job

The minimum age varies from 18 to 22, depending on the airline. Applicants must be high school graduates. Business experience or training in airline operations at schools offering such courses are sometimes required. On-the job training is given. A ground attendant may be required to work at the ticket counter in the terminal. Therefore, foreign language ability is helpful at international airports.

SKYCAP

Nature of the Work

Skycaps help passengers with baggage and answers their questions about departures, arrivals, and terminal facilities. Skycaps assist passengers to and from taxis, buses, and cars, and they may check in baggage at the terminal entrance. At many air terminals, the skycaps are employed by the airport rather than by the airlines.

Working Conditions

Skycaps work inside the air terminal and outdoors. They must wear a uniform. Shift work is required. Skycaps lift and carry heavy luggage, and they handle baggage hand-carts in the terminal.

Wages

Wages range from $1,200 to $2,200 per month. Skycaps receive tips, which can be considerable if numerous passengers use the terminal and the skycap is helpful and outgoing.

Opportunities for Advancement

Skycaps may advance to the position of supervisor of skycaps or to a sales representative.

Requirements for the Job

A high school graduate is preferred. The minimum age is 18 to 21, depending on the airline. Applicants must like to help people and be physically fit. On-the-job training is available. One airline fills this job from the ranks of ramp servicepersons.

AIR FREIGHT OR CARGO AGENT

Nature of the Work

The air freight agent receives air freight shipments, supervises loading and unloading, and keeps records. Air freight agents handle contacts with air freight forwarders and customers.

Working Conditions

The work is done indoors in an office adjacent to the air freight terminal. Telephones, computers, and hand calculators are used. Shift work is required.

Wages

Wages generally run from $1,300 to $2,700 per month, but some agents earn considerably more.

Opportunities for Advancement

An airfreight or cargo agent may advance to the position of ramp service planner or supervisor of air freight handlers. Promotion to the air freight sales staff or air cargo management staff are possible.

Requirements for the Job

A high school graduate with experience in shipping operations is preferred. Applicants must like to work with records and be detail-oriented. Physical strength is also required.

PASSENGER SERVICE AGENT

Nature of the Work

The passenger service agent responds to abnormal conditions—passengers needing special assistance, oversold flights, missed connections, heavy passenger concentrations—to expedite loading or unloading of passengers. A passenger service agent may also perform the duties of ticket agent and supervise the ticket office.

Working Conditions

The passenger service agent wears a uniform and works at the air terminal. Shift work is required. A wide variety of challenges characterizes this job.

Wages

The salary ranges from $1,600 to $2,700 per month.

Opportunities for Advancement

Qualified, dedicated workers can advance to various managerial positions. The job of a passenger service agent is excellent training for subsequent work in sales, customer service, and flight operations departments.

Requirements for the Job

High school graduation is a minimum requirement. A thorough knowledge of flight schedules and ground services is necessary. On-the-job training is normally provided. If employed by an international airline, the passenger service agent may need to know a foreign language. Experience as a ticket or reservations agent is helpful.

SALES REPRESENTATIVE OR ACCOUNT EXECUTIVE

Nature of the Work

Sales representatives or account executives explain to prospective customers the advantages of their company's service for travel and shipment of cargo. They also maintain contact with travel agencies, businesses, and educational institutions, as well as with other airlines to increase interline sales. Sometimes they make hotel reservations for customers. A knowledge of flight and fare schedules is essential.

Working Conditions

Sales representatives work business hours and wear business attire.

Wages

Salary ranges from about $17,000 to $35,000 per year.

Opportunities for Advancement

Sales representatives may advance to the position of district sales manager.

Requirements for the Job

A college degree with courses in air transport management is desired. Applicants must be assertive, yet personable. They must show initiative and be willing to relocate. The ability to speak persuasively and convincingly is necessary. International airlines may require foreign language ability. Courses in psychology, public speaking, and salesmanship are helpful. On-the-job training is provided. NOTE: Some airlines hire college students for training in sales promotion during the summer vacation. On their return to college, the students become campus representatives for the airline, contacting other students and faculty members to acquaint them with the airline's special service and holiday opportunities . These part-time jobs often lead to full-time employment in sales positions after the students graduate from college.

DISTRICT SALES MANAGER

Nature of the Work

The district sales manager is in charge of the ticket and reservations sales offices in the area. This position requires many contacts with people to promote air traffic and sales of airline seats and cargo space. The sales manager directs the activities of other sales personnel.

Working Conditions

The district sales manager works in a downtown office during regular business hours. To promote the airline, attendance at many meetings and social affairs "after hours" are usually required.

Wages

The salary ranges from about $25,000 to upwards of $50,000 per year.

Opportunities for Advancement

The district sales manager may advance to a larger district with a corresponding increase in responsibilities and salary. Promotion up to a top job as "Vice President-Sales" is possible.

Requirements for the Job

This is not an entry-level job. Vacancies are almost always filled by employees who move through the ranks.

RAMP SERVICE PERSONNEL
(Cabin Service, Exterior of the Aircraft, Baggage and Air Cargo Handler, Aircraft Fueler, Driver)

Wages

Wages range from about $9 to $ 17 per hour, with extra pay for late afternoon and night shifts.

Opportunities for Advancement

Depending on the ramp size of the airline and agreements with the employees' unions, ramp servicepersons may become leaders and supervisors of the crews in their own work areas. From the lowest paying jobs, such as cleaners of the cabin and exterior of the aircraft, diligent employees can work their way up to higher paying jobs, such as baggage handlers, drivers, and aircraft fuelers. With experience at a variety of ramp service jobs, workers with administrative abilities may be promoted to ramp planner.

Requirements for the Job

A high school diploma is normally required and the minimum age is 18 to 21, depending on the airline. Ramp servicepersons who drive trucks, buses, fork trucks, towing tractors, and similar equipment must have a driver's license. A chauffeur's license may also be required.

Good physical health and strength are necessary for baggage and air cargo handlers. On-the-job training is given when new equipment is put into service or when better methods of accomplishing a job are developed.

Cabin Service

Nature of the Work

The cabin serviceperson cleans the airplane and cockpit between flights. Responsibilities include vacuuming the floor, picking up trash, washing lavatories and buffets, replacing headrests and pillow covers, folding blankets, refilling seat packets, refilling drinking water supply, and cleaning the cockpit windows.

Working Conditions

This employee uses cleaning equipment and must work at a fast pace and in cramped area with a team of workers . The job often must be completed within 10 or 15 minutes allowed before the plane loads passengers. There is shift work, and uniforms must be worn.

Exterior of Aircraft

Nature of the Work

This ramp serviceperson washes, polishes, touches up paint, and de-ices the exterior of the aircraft. Chemicals are used to prevent corrosion of surfaces.

Working Conditions

Ramp servicepersons sponges, brushes, mops, and hoses to clean the outside of planes. They must stand on scaffolding or ride special lift equipment to reach high places. Although usually in a hangar, they sometimes work outdoors. The heaviest work schedules are at night, when most aircraft are not in service. Shift work is required, and work is done frequently under pressure of time. Uniforms must be worn.

Baggage and Air Cargo Handler

Nature of the Work

The baggage and air cargo handler loads and unloads baggage, air mail, air express, and air cargo shipments. Handlers drive baggage tractors and operate conveyors, fork lifts, fork trucks, and other baggage and air-freight-handling equipment. Machinery also is used to sort and route baggage and air cargo to and from various flights.

Working Conditions

This ramp serviceperson works outdoors on noisy, crowded ramps in all kinds of weather. Considerable lifting and moving of baggage, mail sacks, and air express shipments and pushing and positioning of air cargo are required. Shift work is required, and a uniform must be worn.

Aircraft Fueler

Nature of the Work

The aircraft fueler operates the fueling equipment. Using a fuel hose and pumps, the fuel truck is filled with aviation fuel and driven it to the aircraft.

Working Conditions

The aircraft fueler works outdoors in all kinds of weather with potentially hazardous aviation gasoline and kerosene. Shift work is required, and a uniform must be worn. To reach the fuel tank openings, the aircraft fueler may need to climb up and walk along the wings of the aircraft. Strict safety rules must be observed.

Driver

This job category includes drivers of food trucks, mobile stairs, employees' buses, messenger cars, conveyors, cleaning equipment, aircraft air conditioning and power carts, and other equipment.

Nature of the Work

These employees drive equipment to the aircraft and operate machinery used to load and off-load food containers, galley units, and other kinds of equipment. They attach and detach ground air conditioning and power carts, move stairs, or drive employee buses between airline facilities at the airport. They are usually on a regular work schedule.

Working Conditions

Drivers wear uniforms and work shifts. They spend their time outdoors on noisy ramps in all weather conditions. They must use extreme care in positioning equipment near aircraft.

CABIN MAINTENANCE MECHANIC

Nature of the Work

The position of cabin maintenance mechanic is not to be confused with the position of airframe and powerplant mechanic. The cabin maintenance mechanic cleans and paints interiors of aircraft during periodic major overhauls; removes and installs carpets, seats, curtains, and bulkheads; and reupholsters seats. A cabin maintenance mechanic overhauls and cleans electrical equipment in cabins, such as lights, buffets, and coffee makers.

Working Conditions

In hangar shops, the cabin maintenance mechanic stitches upholstery and curtains on sewing machines. Other tools associated with upholstery, rug laying, installation of seats, electrical maintenance of cabin service equipment, and sheet metal work are used. Work must be completed on schedule. Shift work is necessary, and uniforms may be required.

Wages

Wages range from about $12 to $19 per hour.

Opportunities for Advancement

The employee may advance to leader, assistant supervisor of cabin maintenance, and then to supervisor.

Requirements for the Job

A high school diploma is required. Technical or vocational school training in the various mechanical skills is usually required. A worker may specialize in one kind of job.

FOOD SERVICE EMPLOYEES
(Cooks, Bakers, Pantry, Dining Service, and Kitchen Helpers)

Nature of the Work

Food service employees follow set recipes to prepare and cook food. They also arrange silverware and dishes on serving trays and put food items in serving dishes. They place the food in either hot or refrigerated containers for pickup and delivery to the aircraft. Food service employees also receive and clean soiled dishes.

Working Conditions

They work in a flight kitchen at the airport. Work must be completed according to flight schedules. The kitchen is a busy, noisy place. Shift work is required, and uniforms must be worn.

Wages

Wages range from about $7 to $10 per hour, plus extra pay for late afternoon and night shifts.

Opportunities for Advancement

A food service employee may advance to the position of pantry worker, steward chef, supervisor, chief chef, assistant buyer, or commissary chief.

Requirements for the Job

High school graduation is desired. The minimum age requirement is 18 to 20, depending on the airline. All workers must have health certificates. A respect for cleanliness and good housekeeping procedures is mandatory. Chefs and cooks must have previous experience in food preparation, on-the-job training is given for all other kitchen workers. Food service employees must be willing to work shifts.

RAMP PLANNER

Nature of the Work

Ramp planners keep track of arriving aircraft and dispatch service units—cleaners, fuelers, baggage handlers, food service trucks, etc. They must know flight schedules.

Working Conditions

These employees work indoors at the airport, using charts, telephones, teletype machines, and computer terminals. Shift work is necessary. They work as a team with other planners.

Wages

Wages range from about $19,000 to $33,000 per year.

Opportunities for Advancement

Workers may advance to junior positions on the flight operations management staff or on the administrative staff of an airport director.

Requirements for the Job

A high school diploma is required and the minimum age is 20 to 25, depending on the airline. The position of ramp planner is not an entry-level job; experience as a ramp serviceperson is usually necessary.

AUTO MECHANIC

Nature of the Work

The auto mechanic services and repairs ground service equipment, such as portable stairs, fuel and food trucks, towing tractors, and employee buses.

Working Conditions

Repairs are made indoors in a garage or outdoors on the ramp. The duties are those usually associated with an auto mechanic. The normal work week is 40 hours.

Wages

The annual salary range is from about $19,000 at the entry level to upwards of $45,000 for supervisors and those with high seniority.

ENGINEER

Nature of the Work

The engineer works closely with aircraft manufacturers during the development of new models of airliners. The job entails making sure the requirements of the airline are met regarding performance, aircraft accessories, cabin plan, interior decorations, extra equipment, etc. The engineer also designs improvements to aircraft and to methods of servicing and overhauling them.

Working Conditions

Most of the work is performed indoors in an office, but sometimes the engineer must visit hangars and maintenance shops for consultations and inspections. Frequent travel to aircraft manufacturing plants may be necessary. The engineer may be required to live in the area where the aircraft are being constructed; upon completion of the planes, they would then move to the airline headquarters.

Wages

The average starting salary is approximately $30,000.

Opportunities for Advancement

An engineer may be advanced to a job supervising junior engineers or to a top position as vice president for engineering or maintenance.

Requirements for the Job

A college degree with a major in an engineering field related to air transportation is required. Previous experience and a graduate degree are desirable.

INSTRUCTORS
(Ground School Instructor, Flight Attendant Instructor, Flight Simulator/Duplicator Operator)

Nature of the Work

An important factor in maintaining the airlines' excellent safety record is their training effort. Several thousand people are employed to maintain the proficiency of flight crews and ground personnel engaged in direct contact with the airplane, powerplants, and flight techniques. Instructors direct the pre-service and in-service training programs of the airline. For example, they make certain that the pilots keep up their instrument flying proficiency. The use of flight simulators and other ground training devices is supervised by an instructor. Educators are also employed as curriculum and program developers . Technical support is provided by craft workers who develop training aids for use by the instructors in the airlines' classrooms.

Wages

Salaries range from about $14,400 to $36,000 per year, depending upon the tasks performed.

Opportunities for Advancement

Instructors may advance to executive positions in the training department.

Requirements for the Job

Instructors can qualify, in some instances, on the basis of two years of airline employment, plus supervised teaching experience in a specialty. Those who instruct by means of a ground training device are required to understand how to maintain and repair that device. Familiarity and experience with electronic equipment are helpful.

ADMINISTRATIVE PERSONNEL

In addition to the jobs already described in this brochure, the airlines employ thousands of receptionists, typists, secretaries, stenographers, mail and file clerks, and computer personnel, as well as people in managerial positions such as training, public relations, publications, finance, personnel, and other kinds of work associated with business and industry. The salaries are generally above the average paid by industry and business.

PROFESSIONAL PERSONNEL

Professional job opportunities within the airlines today break down into the following categories: architects,

aeronautical research scientists, engineers, drafters, doctors, nurses, lawyers, and instructors. Many of these jobs require intensive education and specialized training. The salaries are among the highest paid to airline employees. The personal qualifications are the same as those for professionals in other fields. Excepting drafters, instructors, and nurses, professional personnel should be college graduates with postgraduate training and experience, each in a field of specialization. Drafters usually can substitute four years of work experience for formal training at the college level. Nurses must be registered.

OUTLOOK FOR THE FUTURE

The deregulation of the airline industry, which began in the mid-1970s, greatly changed the way the airlines operated. Existing airlines exercised their new found freedom by expanding some routes and discarding others. Many new airlines, mostly regionals, appeared on the scene. All of the carriers could raise or lower their fares at will, a privilege they had not enjoyed in the past resulting in promotional fares and other marketing activities that induced many more people to fly.

The overall result has been an expansion of the airline industry. However, there is a downside: the industry has become less stable. Some airlines have merged, and others have gone out of business entirely, causing a dislocation of employees.

Continued growth of the airline business is likely. The economic health of the airlines, however, is directly related to the economic strength of the country as a whole, as well as to outside influences, such as the cost of fuel.

An Airline Station Manager Talks About His Job

Gary King is the Cincinnati Station Manager for Comair, Inc., one of the Delta Connection regional airlines. He supervises the 300 people who staff the Comair station at Greater Cincinnati International Airport.

My career started with TWA here in Cincinnati. You might say at the bottom. I started as a ramp agent. During my tenure with TWA, I had exposure to ramp positions, fueling aircraft and handling air cargo. I received several promotions and eventually was transferred to Chicago's O'Hare International Airport, where I was put in charge of the airfreight department. We had something like 280 people in that area at the time, but international economic conditions caused a downturn in the air freight business; it went into a demise, you might say, and so did all the positions. I was furloughed.

So I put my job search into gear. I answered an ad in the Chicago Tribune. Comair was seeking a manager ironically, for me for the Cincinnati area. I was pretty familiar with the airport and with many of the airport managers and administration offices, and had a pretty good background. I interviewed for the position and was hired.

Basically, the station manager's job is administrative. I deal with station operations—the passenger aspects, ground service, equipment, and fueling—all facets of running the station.

A typical day has one constant in it: the flight schedule. However, different situations occur every day. Different people fly, different personalities interact and must be contended with. Basically, I look at our operating statistics from the previous day, go through a lot of budgetary items, authorize bills, have numerous meetings to discuss operational concerns.

Some of the characteristics that I possess, and that I think a person has to have for success at this type of job, relate to motivation and to self-management. A person has to be goal-oriented. That's number one. Secondly, a person has to know how to manage his or her time effectively in order to complete an eight- or ten- or twelve-hour day. The person also has to have, not be a presuming type of individual, nor a knee-jerk reactor, but one who can analyze, evaluate, and implement.

The only dislikes I have about this job are those things I don't have the ability to control, such as weather and the delays and mechanical problems that force cancellations of flights. Other than that, the day is challenging enough, and it keeps me motivated.

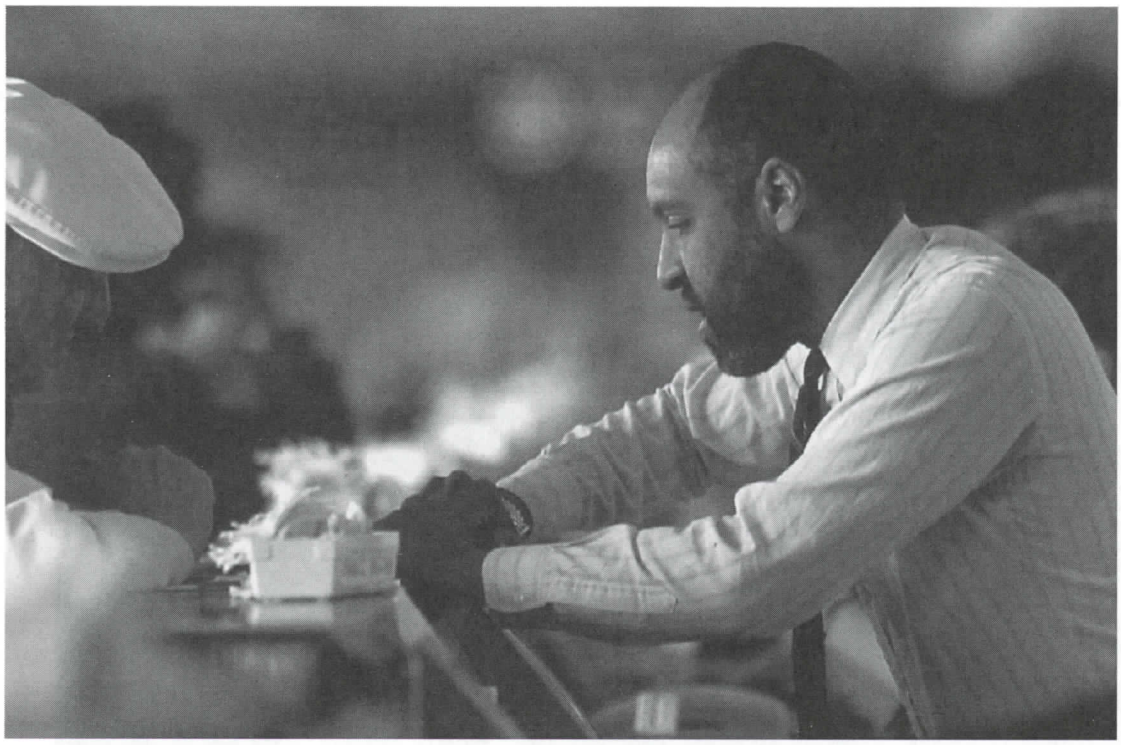
With regard to future goals—and I am a goal-oriented individual—I like challenge. If there's a challenge, I'll more than likely be the first person to volunteer. So, for any promotional opportunities that arise that look beneficial, I'll put my name in the hat.

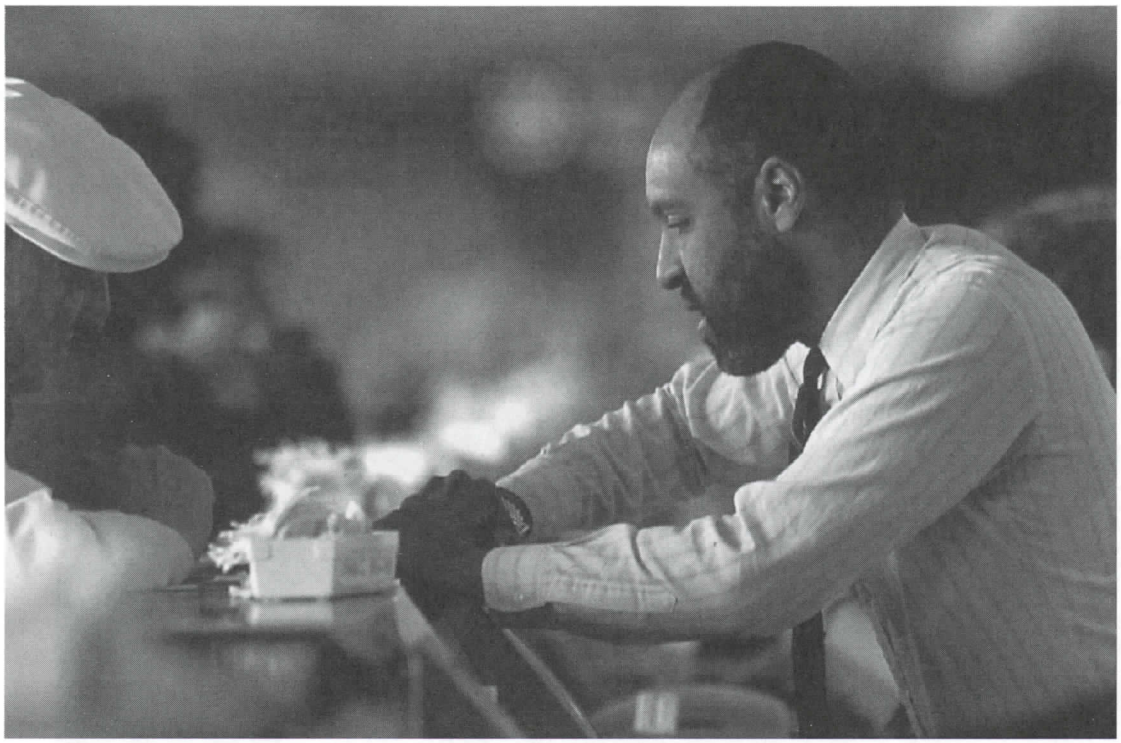
In terms of a desirable background for the airline industry, I think I was accepted at TWA in the first place for my people skills: handling customers and employees. That was the catalyst for my success, and that's what you have to have for getting into the airline industry. Having a caring attitude, listening to individuals, looking at people on an individual basis—these things are essential.

I do feel that some college background is important to someone who wants to do what I have done. I have studied business administration. The more administrative background you have, the more business-oriented curricula you have in your resume, the better.

People should also remember that the airline industry has been pretty much painted with a facade where only the front line people—such as ticket agents, travel agents—have been identified in the public mind. But there are many other areas, such as finance and marketing. An airline is run just like any other business, and possessing a background in marketing or finance is an advantage. All airlines are searching for good individuals in many areas. So even though the front-line people, such as pilots and flight attendants, may seem to be the most visible to the public, there are other jobs in the industry requiring other backgrounds.

To conduct a successful job search, people should be persistent. Having the educational background is a plus, obviously, but it's a competitive world here, and persistence tells an employer that this person is going to be good for their operation.



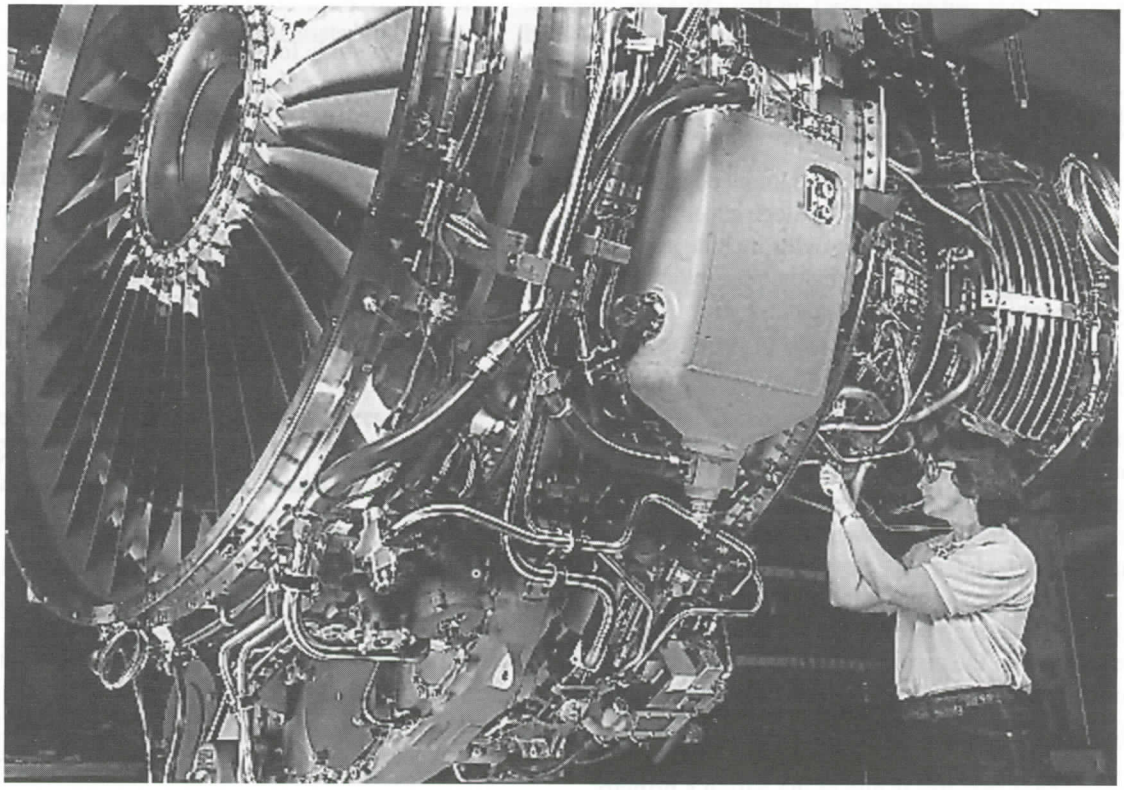


U.S. Department
of Transportation

**Federal Aviation
Administration**

Aviation Career

AIRCRAFT MANUFACTURING



Aviation Career - Aircraft Manufacturing

GENERAL INFORMATION

The world would be vastly different without the airplane. We depend on it to transport people and goods, to explore, to search and rescue, to fight fires, and, of course, to defend our Nation and our allies.

Would you like to become involved in manufacturing aircraft, perhaps even designing the planes of the future? Aircraft manufacturing is a vital part of America's vast aerospace industry that also includes missiles, satellites, spacecraft, and navigation and guidance systems. There are four major aircraft manufacturing divisions: airframe, components, accessory and equipment, and engine.

The industry requires skilled scientists, engineers, technicians, production workers, and administrative and support activities personnel. Each of these five job categories will be discussed in this brochure.

SCIENTISTS AND ENGINEERS

Scientists and engineers must have knowledge or training that is equivalent to a four-year college education with a major in these areas. Scientific fields include aerodynamics, physics, mathematics, chemistry, physiology, metallurgy, cryogenics, meteorology, and avionics. An exciting new field of study concerns the uses of composites and ceramics in aircraft manufacturing.

Engineering fields include design, aerodynamics, avionics, instrumentation, manufacturing materials, weights and balance, field service, and flight test. College degrees are offered in aeronautical, aerospace, ceramic, chemical, civil, electronic, electrical, industrial, mechanical, metallurgical and nuclear engineering, engineering mechanics, and engineering physics. One out of five of the engineers in the aerospace industry has an aeronautical or aerospace engineering degree; the others received degrees in other disciplines.

The aerospace industry is one of the nation's primary employers of scientists and engineers for research and development. More than half of the industry's scientists and engineers are in research and development. The remainder are in production planning, quality control, tool designing, technical purchasing, technical sales and service, technical writing and illustrating, and related fields.

Technical areas of endeavor include aircraft and flight equipment, chemistry, communications, detection, electrical equipment, electronics and electronic equipment, fluid mechanics, fuels and combustion, ground transportation, equipment, installations and construction, materials (non-metallic), mathematics, metallurgy, military sciences and operations, navigation, nuclear propulsion, ordnance, personnel and training, physics, propulsion systems, and research and research equipment.

TECHNICIANS

This job category includes all persons engaged in work requiring knowledge of physical or life sciences, engineering, and mathematics. This knowledge can be acquired at technical institutes or junior colleges, or through other formal post-high-school training. Equivalent on-the-job training or experience may be acceptable. (Craft workers, such as machinists and electricians, are not included in the technicians job category.)

The fields of study for science technicians and engineering technicians are the same as those already mentioned above for scientists and engineers. Technicians also can be drafters or technical writers and illustrators. Examples of technicians titles are as follows: senior documentation analyst, software programmer, contracts administrator, technical illustrator, technical writer, supervisor of blueprint and microfilm files, tool designer, training equipment designer, drafter, research mechanic, research electrician, laboratory technician, electronics technician, and production planner.

AIRCRAFT MANUFACTURING EMPLOYEES

This job category includes working supervisors and all non-supervised workers engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping, maintaining, and repairing aircraft. It also includes janitorial and guard services, product development, auxiliary production for a plant's own use, record keeping, and other services closely associated with the aforementioned operations.

Aircraft manufacturing employees can have a variety of occupations: sheet metal and other metal-processing work, composite fabrication, machinery and tool fabrication, assembly and installation, inspecting and testing (quality control), flight check-out, materials handling, and maintenance. Administrative and support activities personnel include executives responsible for direction and supervision of research and production; officials in departments such as sales, purchasing, personnel, accounting, public relations, advertising, and industrial relations; and secretaries, stenographers, typists, clerks, and tabulating machine operators.

Nature of the Work

Scientists, Engineers, and Technicians. Almost every branch of science and engineering is involved in the design and production of faster and more efficient aircraft and in the inflight operation and ground servicing of planes, their passengers and cargo. The mechanical and electrical equipment needed by the airlines is increasingly complex. The challenge facing aircraft manufacturers today is to build planes that are more cost-effective. Jumbo jets are being replaced by somewhat smaller aircraft that are more fuel efficient and offer lower passenger seat/mile costs. Also needed are specialized aircraft for business and recreation purposes. All designs must provide improved safety factors and must address environmental considerations especially noise reduction.

Professional scientists and engineers and semiprofessional technicians work in one of three major areas: (1) research, design, or development; (2) production, operation, or control; and (3) installation, maintenance, or sales engineering. The emphasis is on thinking and on team work—a coordinated effort by scientists, engineers and technicians.

Scientists are chiefly concerned with basic and applied research-the search for scientific knowledge, new concepts, the extension of theory, and the practical applications of this knowledge and theory. Engineers normally have a definite goal in mind: namely, designing a specific piece of equipment so it will perform a specific task. Working closely with scientists and engineers, technicians concentrate on the practical aspects of using and testing equipment, not on the theory involved in building it. Technicians usually begin as trainees or in the routine positions under the direct supervision of an experienced technician, scientist, or engineer. As technicians gain experience, they receive more responsible assignments. The team of scientists, engineers, and technicians is concerned with all phases of the development of aircraft—from the initial planning and design to the final manufacturing and testing.

A little more than half of all aircraft manufacturing employees are production workers or "blue collar" workers. They fabricate, assemble, install, and test the many parts of a modern airplane. Other plant workers handle materials and provide maintenance and custodial services. These occupations range from highly skilled to semiskilled jobs.

Working Conditions

Scientists, engineers, and technicians work primarily indoors at a desk or in a laboratory. Some outdoor work may be necessary. Research and engineering departments are usually in modern, clean, and temperature controlled factory buildings. These departments are normally equipped with the latest electronic and mechanical instruments, drafting instruments, and laboratory apparatus.

Most administrative and support activities personnel also work in modern, clean, temperature-controlled of offices.

Aircraft Manufacturing employees work in departments such as riveting, metal-processing and welding. These areas are filled with the noise of metal cutting, riveting guns, and power tools. Employees engaged in composite fabrication have a quieter job since the substances they mold essentially begin as fabric. Resins are molded rather than stamped, shaped, and riveted. The loudest noise is often the whir of a hair dryer as it heats the fabric.

Some jobs generate fumes and odors. Assemblers often, work in hard-to-reach cramped spaces; they must stoop, kneel, crouch, and crawl to perform their tasks. Assembly, welding, and molding operations and mechanic and machine shop jobs require frequent lifting or carrying of heavy loads (up to 50 pounds) and medium loads (up to 25 pounds). Although there are some hazards, aviation plants are relatively safe working places: their injury frequency rate averages less than that for the manufacturing industry as a whole.

Where the Jobs Are

Almost every state has some aircraft manufacturing jobs. The largest concentration is in California. States with many jobs include New York, Washington, Connecticut, Texas, Florida, Ohio, Missouri, Pennsylvania, Massachusetts, Kansas, Alabama, Maryland, New Jersey, and Georgia.

Wages and Benefits

Scientists and Engineers. The median entry-level salary of a scientist or engineer is about $40,000 a year, with top pay escalating to about $93,000. Earnings are generally highest in the West, lowest in the South; the larger the city is, the better the pay. Scientists and engineers generally begin their weekday between 6 and 9 a.m. and work an eight-hour day, or overtime as projects necessitate. Employers often pay scientists and engineers to attend seminars and meetings of professional societies. Some also pay the membership dues of these societies, as well as the tuition for classes and continued education in the employee's field of expertise.

Average hourly pay for aircraft production workers ranges from about $17 to $19, depending on the type of work being performed.

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Opportunities for Advancement

Scientists and Engineers. Promotion to senior scientist or senior engineer brings a pay increase. The chief advancement possibilities involve supervision and management positions and executive positions. The "team" or "project" approach to fulfilling objectives has increased the need for talented managers.

Technicians. A technician can advance to a professional position by getting more education or by performing well tasks normally assigned to professionals. Technicians also can be promoted to supervisory positions. Technicians who have a good working knowledge of the equipment produced by the company and who have the right personality for the job may become company sales persons, technical representatives, or troubleshooters.

Traditionally, skilled workers can advance to positions requiring higher skills and experience, such as foremen, inspectors, and supervisors. Educational opportunities are available to advance to semiprofessional positions. A possible advancement progression in engineering might be from assembler to quality control inspectors, to engineering technician to junior engineer, and finally to engineer. Union contracts normally require advancement of semiskilled workers to be based upon seniority of qualified individuals. By taking courses offered by the company or by vocational or technical schools in the community, semiskilled workers may prepare themselves for a skilled job, such as blueprint reading, welding or mechanic.

Administrative and Support Activities Personnel. Advancement in these areas is normally to similar positions with greater responsibilities and higher salaries.

Requirements to Enter the Job

The aircraft manufacturing industry seeks individuals with self-discipline, a willingness to accept responsibility, a sound foundation in technology, and team spirit. More and more women are pursuing careers in the industry. For example, at Beech Aircraft Corporation, a manufacturer primarily of corporate and military airplanes, women make up about 50 percent of the work force in the composites production area. About 30 percent of its metal-manufacturing, assembly-line jobs are held by women. And according to a Stanford University report, the University has seen an increase in the number of freshman women enrolling in engineering because of the excellent job prospects. More and more universities across the nation report similar increases.

Scientists and Engineers. A college degree in one of the sciences or in engineering is the minimum requirement for scientific or engineering jobs. Applicants frequently have advanced degrees. (Infrequently, someone with years of semiprofessional experience and some college or college-equivalent training is hired as a scientific or engineer.) An interdisciplinary approach to aircraft manufacturing is taken today, and this requires better training in, for example, the interrelated functions of mathematics, physics, and chemistry. A solid foundation in the fundamental concepts and basic general areas of science and engineering is recommended. There is a need for constant study to keep up with the rapidly changing technology.

Technicians. Much of what has been mentioned concerning scientists and engineers applies to science technicians and engineering technicians. An Associate in Science degree or Associate in Engineering degree is normally required or a diploma from a college or university, junior or community college, technical institute, or technical or vocational school. Technical institutes offer courses designed to qualify the graduate for a specific job or cluster of jobs immediately upon graduation and with a minimum of on-the job training. One may qualify for some technician jobs by completing an on-the-job training program or taking part-time, post-secondary school-level courses. Experience obtained while on active duty with the military services or other work experience is taken into account by employers.

Aircraft Manufacturing Employees. The training required for plant jobs varies from a few days of on-the-job instruction (for semiskilled workers such as material handlers and guards) to several years of formal apprenticeship (for craft workers such as machinists, tool and die makers, aircraft mechanics, sheet metal workers, pattern-makers, and electricians). Workers with little or no previous training or experience may be hired for assembly jobs requiring the least skill. Skilled assemblers, however, may need two to four years of plant experience, plus a high school education or vocational or technical school education, or the equivalent. Workers with little experience begin as helpers or assistants and develop their skills on the job and by taking training courses offered at the plant. An individual may increase his or her chances of being hired by acquiring a skill at a vocational or technical school.

Administrative and Support Activities Personnel. The requirements for these jobs are generally the same as the requirements for similar jobs in other industries. A person's chances for employment can be improved by acquiring a knowledge of engineering, technology, and the aviation industry.

Opportunities for Training

Because workers who are highly trained and knowledgeable about new developments are needed in the industry,

most aircraft plants conduct training classes or pay tuition and related costs for employees to take courses at schools in the community. Some plants do both. Some classes are held during working hours; the trainee is paid for class time. Other classes are held after working hours. Courses are available for practically every occupational group and cover many skills and areas of knowledge.

Many aircraft plants provide their employees with financial aid for college enrollment. This aid is furnished either as direct grants or in the form of scholarships, and it is possible for an employee to work and to continue his or her education at the same time. These opportunities help workers advance more rapidly to higher skills and to better paid jobs.

The best jobs go to those with the most education. A high school education, at the minimum, is practically mandatory for any worker in the aircraft industry. Post-secondary-school training is vitally important, and such training may be obtained from area vocational-technical schools, technical institutes, junior or community colleges, or four-year colleges or universities.

Outlook for the Future

The aviation industry has had its ups and downs over recent years. Airline deregulation in the 1970s opened the airways to more regional carriers, but a number of major airlines have either merged or ceased operation. On the other hand, the surviving airlines have placed substantial orders for the newer, more efficient aircraft.

The demand for general aviation aircraft has been flat for some time, but recent changes in aviation product liability laws which are favorable to the manufacturers of small planes may give some new life to this segment of the industry. The manufacture of military aircraft has been affected by defense cutbacks resulting from the end of the cold war and the need to reduce government spending. Employment in the manufacture of commercial transport aircraft peaked in 1991 at 124,200 workers, then declined to 91,500 in 1993, with a further reduction to 86,400 estimated for 1994. Future growth will be greatly dependent on economic conditions in the US and abroad. Job opportunities should be most favorable for highly trained workers, such as scientists, engineers, and technicians, but less skilled workers also will be needed to fill entry level production positions.

AEROSPACE INDUSTRY EMPLOYMENT DECEMBER 1980-DECEMBER 1991

TYPE OF EMPLOYMENT	1980
Aircraft Manufacturing Employees	414,000
Scientists & Engineers	158,000
Technicians	62,000
All Others	268,000
Total	**902,000**

TOTAL OF EMPLOYMENT	1985
Aircraft Manufacturing Employees	392,000
Scientists & Engineers	175,000
Technicians	67,000
All others	305,000
Total	**939,000**

TYPE OF EMPLOYMENT	1990
Aircraft Manufacturing Employees	420,000
Scientists & Engineers	196,000
Technicians	62,000
All others	266,000
Total	**944,000**

Source: Aerospace Industries Assn.

An Engineer Talks About His Job

Ed Leng is an engineer with Hughes Aircraft in the Los Angeles area.

During the years I've been with Hughes, I've learned that the most important skills I use each day are thoroughness and the ability to analyze, which enables me to approach a problem from a logical point of view.

You should also have an open mind, and be able to take suggestions from supervisors and co-workers. It's important to be a team player. While creativity is a plus, a solid foundation in math and the sciences is vital. Basic training should be in math and physics. A solid background in these areas is far more important than being creative.

I design infrared systems for military helicopters. The end product is almost like a TV image for helicopter pilots. I use CAD-CAM, which required some training, and that is available through internal company seminars. These training courses last three to five days. However, because I was familiar with an IBM PC, I relied upon computer manuals. But I'll soon enroll in the sessions in order to familiarize myself with more technical systems. Clearly, some computer experience is a plus.

I graduated from the University of Southern California engineering school with a BS degree; a Masters degree is important if a graduate wants to advance and eventually wind up in a management position. But an advanced degree isn't really necessary in order to work in the aerospace industry. However, where you go to school will determine your salary, to some extent. A grad of MIT, CalTech, or Stanford will get the big money up front. Someone out of a small institution won't receive the same sort of salary.

I think that a prospective employer looks at schooling and grade point average, but personal chemistry during an interview is important. Don't count yourself out if you are articulate and can converse with an interviewer. That helps a lot. So, in addition to a degree and the standard credentials, having good interviewing skills is an important part of any education.

U.S. Department
of Transportation

**Federal Aviation
Administration**

Aviation Career

AVIATION MAINTENANCE & AVIONICS

Aviation Career — Aviation Maintenance and Avionics

AVIATION MAINTENANCE AND AVIONICS

Nature of the Work

Aviation maintenance technicians (including airframe and powerplant technicians, avionics technicians, and instrument person) 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 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 modem 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 repair 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 by rushing 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 works 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.

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.

U.S. Department
of Transportation

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Administration**

Aviation Career

AIRPORT CAREERS

GENERAL INFORMATION

The airport is one of the most vital elements in our air transportation system. A well-equipped airport provides a variety of facilities for the aircraft and for crews and passengers. These include runways and taxiways, which may be lighted for day-and-night use; a terminal building with lounge areas for passengers, and possibly a restaurant and shops; automobile parking lots; ramp areas and hangars for aircraft storage; and maintenance shops for aircraft and avionics.

In the United States, there are about 13,000 airports and 4,000 heliports (landing sites for helicopters). About 5,000 of these landing facilities are used by the public. It may surprise you to learn that only about 650 airports are served by airlines; most of the Nation's airports are used by general aviation pilots and their aircraft. The atmosphere at these airports is usually a lot less hectic and pressured than the environment at a major airline facility.

Some airports are owned by municipalities—states, counties, and cities. Others are operated as privately-owned businesses.

Described in this section are eight different positions you can expect to find at an airport: airport director/manager, assistant airport manager, engineer, safety personnel, service person, terminal concessionaire, fixed base operator, and line person.

AIRPORT DIRECTOR/MANAGER

Nature of the Work

Airports are usually operated by a director or manager responsible either to the private owners of the airport or to the local government authorities. The airport manager must be a person of many talents. An airport manager must be competent in public relations, economics, business management, civil engineering, personnel management, labor relations, and politics. The manager is involved in executive business decisions and may be responsible for:

1. Making and enforcing airport rules and regulations.
2. Planning and supervising maintenance and safety programs.
3. Negotiating leases with airport tenants, such as airlines.
4. Assessing the future needs of the airport and making recommendations.
5. Setting up the airport budget.
6. Promoting the use of the airport.
7. Training and supervising employees.

Depending upon the size of the airport, the manager may have one or more assistants, such as an assistant manager, engineer, controller, personnel officer, and maintenance superintendent. Supporting office workers (such as secretaries, typists, and clerks) also may provide assistance to the airport manager.

If the airport is operated by a city, the accounting and payroll functions may be done at city hall rather than at the airport. Conversely, some airport managers control a large professional staff and have total responsibility for all matters relating to the operation of the airport.

If self-employed as a small airport operator, the manager probably also operates an aircraft repair station, sells aviation fuel, gives flight lessons, and offers taxi or charter flights.

Working Conditions

Working conditions will vary greatly, depending upon the size of the airport. At a large airport, the manager works in an office usually located in the terminal building. Office hours are regular except in times of emergencies. Travel may be required to negotiate leases with airline tenants or to confer with state and federal officials. At a very small airport, the manager may spend long hours giving flying lessons, making charter flights, or working in the aircraft repair station.

In many cases the airport manager is a part of the local government and is involved in official meetings and community projects, especially those concerned with aviation.

Where the Jobs Are

The greatest number of airports with a permanent, full time work force are located in California, Florida, Illinois, Indiana, Michigan, Missouri, Ohio, New York, Pennsylvania, and Texas. However, there are full-service airports in every state of the Union.

Requirements to Enter the Job

As with any managerial position, the job of an airport manager requires experience and training. And, of course, large complex airports demand more in-depth background than do smaller ones. Managers of airports

that provide airline service usually are required to have a college degree in one of the following areas: airport management, business administration, or aeronautical or civil engineering.

One study evaluated the importance of a number of educational areas in airport management. Besides a college degree, the study rated as "very important" a background in public relations, air transportation, business management, engineering, and personnel administration.

The airport manager may need to have experience as an assistant at an airport. Managers of small airports can qualify in some cases if they have only a high school diploma, but usually they must have a pilot certificate and three to five years of experience in jobs associated with airport services, such as fixed base operator, superintendent of maintenance, or assistant to the airport manager.

The manager must be familiar with state and federal regulations (especially those pertaining to airports), zoning laws, environmental impact analysis, legal contracts, security, aircraft rescue and firefighting (ARFF), and public relations. Airport managers must have strong leadership qualities, tact, initiative, good judgment, and an ability to get along with others. They should have a good understanding of the needs and concerns of the various users of the airport, including aircraft operators, concessionaires, and the general public.

The manager of a small airport may advance to an assistant director's job at a larger airport. A manager also may move upward to the position of commissioner of airports or to a state-level job concerned with state regulation of airports. Appointments frequently are based on political activity and connections, especially if the job does not come under state or Federal regulations governing civil service.

Often entry-level positions are advertised locally rather than nationally because of civil service restrictions or local policy. Thus, these positions are hard to find. And even when a position is advertised nationally, competition is fierce. To lessen the number of applicants, many prospective employers require several years of experience, according to the American Association of Airport Executives (AAAE).

Opportunities for Training

Numerous universities offer courses and degrees in airport administration, public administration, business administration, and aeronautical or civil engineering and flight training.

To meet the needs of communities that have airports, and to promote the highest degree of professionalism in airport management, the American Association of Airport Executives has an airport management accreditation program. This professional program improves the manager's credentials as the responsible authority on aviation in the community, and it provides the manager national recognition as a qualified professional.

To gain accredited airport executive status, you must become an affiliate member of AAAE. Affiliate membership is open to anyone who has active responsibility for the management or administration of a public airport. As an affiliate, with at least one year of experience in airport management, you may declare your intention of becoming an accredited airport executive. If you are 21 or older and have a four-year college degree, you may then be reclassified as an executive candidate member. Executive candidates lacking a degree may substitute civil airport managerial experience on a 2-for-1 basis, with a total of eight years of experience being the equivalent of a four-year college degree. Executive candidates are expected to complete the professional membership requirement within the three-year time limit.

Once these requirements are completed, the member may use the initials A.A.E. An accredited airport executive has voting privileges and may serve on the board of directors of the American Association of Airport Executives. For more information, you may write to:

American Association of Airport Executives
4212 King Street
Alexandria, VA 22302

Outlook For The Future

Aviation's increasingly prominent role in the economy (the aviation industry annual payroll currently runs about $25 billion nationwide) and the availability of quieter aircraft appear to have affected public attitudes about airport development in some communities. There are prospects for capacity expansion at airports that serve as major airline hubs or connection points such as Atlanta, Denver, and St. Louis. At major airports serving coastal population centers, such as Boston, Los Angeles, and New York, suitable sites for airport development are scarce because most developable land is already used for various purposes. At many of these locations, smaller "reliever" airports have been upgraded to serve general aviation traffic being relocated from congested airports. These trends will provide additional opportunities for airport managers and support staff.

OTHER AIRPORT CAREERS

Assistant Airport Manager: The assistant helps the manager carry out administrative responsibilities. The assistant may be in charge of maintenance employees, airport equipment, airport tenant relations, or any of the other kinds of work associated with an airport.

Depending upon the size of the airport, requirements for the job of assistant manager vary as do salaries. At some airports a high school diploma may be sufficient; at others the assistant manager must have a college degree in business or engineering. Large metropolitan airports typically require three to seven years of prior experience at airports served by a number of airlines.

Engineer: An airport engineer plans improvements and expansion of the airport, checks on plans submitted by architects and contractors, oversees construction, and handles real estate and zoning problems. An engineer may direct maintenance of runways, taxiways, hangars, terminal buildings, and grounds. Engineers are employed mostly by large airports. A degree in civil engineering is normally preferred, plus three to seven years of experience.

Safety Personnel: To meet the need for a high level of safety, most airports with airline service must maintain firefighting and rescue equipment. These airports employ a few trained firefighters and rescue workers, some of whom may be emergency medical technicians or paramedics. Typically, airport firefighters develop the skills of aircraft firefighting as well as building or structural firefighting.

Serviceperson: A serviceperson works under the direction of the airport manager or engineer and may perform one or more of the following activities:

1. ***Cut grass on airport grounds and maintain shrubbery.***
2. ***Operate snow removal equipment.***
3. ***Service runway lights, replacing defective lamps and fuses.***
4. ***Maintain the airport's electrical service, paint, and do general carpentry work on small repair jobs.***

Large airports employ workers who specialize in one of the aforementioned jobs—for example, airport electrician.

Many kinds of servicepersons are needed at airports, although small airports usually contract for required maintenance. Training, qualifications, wages, opportunity for advancement, and union agreements for these workers are the same for other workers in the trades and crafts.

Terminal Concessionaires: Airport terminals provide many services for air passengers. There are restaurants, newsstands, gift and book shops, and car rental agencies. Skycap baggage service is also provided. (Only a few airlines employ skycaps; most leave this service to terminal concessions.) Workers in the airport flight kitchens cater to airlines that do not have their own flight kitchens.

Workers in these concessions are not on the airport manager's staff, but they are included here because of their place in the total employment picture of the airport.

Fixed Base Operator: A fixed base operator (FBO) is a retail firm that sells general aviation products or services at an airport. The FBO may employ one or two people, or it may have as many as one hundred workers. One or more of the following services are offered: aircraft fueling; airframe, engine, and/or instrument repairs; avionics sales and service; aircraft modifications; flight training; ground school; aircraft rentals and sales; and air taxi service and charter flights.

Depending upon the size and scope of the airport operations, the FBO employs linepersons, mechanics, avionics technicians, flight instructors, and aircraft sales persons. The FBO may also carry on a small aviation mechanics training operation, and if a licensed aviation mechanic, supervises the work of mechanics. Customer service personnel will often arrange for ground transportation and overnight accommodations for general aviation pilots and their passengers.

The FBO's place of business can be a small hangar or shop with adjoining office and perhaps a pilot's lounge. Or it can be an elaborate series of hangars, shops, offices, classrooms, and showrooms. The hours are determined by the amount of time the FBO wants to devote to the business.

The FBO is essentially an entrepreneur, the opportunities for increased business and income depend upon initiative and the ability to keep up with changes in aircraft, aircraft equipment, and services. The variety of activities in which an FBO can be involved offer some assurance of a stable income.

The requirements to become a fixed base operator are not clearly defined. Certainly an interest in aviation is basic. A pilot's license is not essential, but such training is useful since it provides a good understanding of the many functions of an FBO as well as contacts with pilots who may patronize the business.

Training in business administration also is helpful in setting up an efficient business operation, and it is proving to be essential to success in times of reduced

general aviation activity brought on by the recent downturn in the national economy.

Student pilot training has been in a decline in recent years, as have sales of new general aircraft—both of which have been traditional sources of income for many FBOs. The trend for growth from 1990 to 2001, according to an FAA study, is in the turbine-powered aircraft. This provides opportunities for a profitable business in the sale of jet fuel and other services to operators of corporate planes. However, a substantial financial investment in facilities would be required.

Lineperson: The fixed base operator employs linepersons or ramp service persons who meet arriving aircraft, guide them to parking spots, assist pilots in securing their aircraft, and otherwise serve the general aviation pilots and their passengers. These duties include fueling and servicing aircraft. One important function is reporting to the aircraft owners any signs of incipient trouble with their planes, such as fluid leaks and low tire pressure.

The lineperson at a general aviation facility has a lot more contact with the public than does someone who performs similar functions for an airline.

Linepersons are often young who are interested in aviation and who begin their aviation careers by building up experience with aircraft under the guidance of a fixed base operator. They are usually paid an hourly rate and often work part time after school, on weekends, and during summers. With their earnings they often fly or take up an aviation mechanic's trade. The lineperson's job is an important basic career development step. It can lead to careers in airport administration, fixed base operation, aviation mechanics, air traffic control, and professional flying.

Other personnel who work either for the FBO or airport manager perform the usual duties of their chosen careers: controller, secretary, typist, etc. Salaries, qualifications, and training opportunities are the same as for other workers in these areas of employment.

GETTING STARTED AS A LINEPERSON

Daniel Sherman is Director of Facilities for Clay Lacy Aviation, which is a Fixed Base Operation (FBO) at Van Nuys Airport in California.

Line service involves taking care of aircraft—parking, fueling, towing. Our line service workers are referred to as customer service people, since they deal strictly with corporate jets. Our clientele demand more attention whether it's having rental cars available, taking care of catering, putting ice and coffee aboard the airplane, or vacuuming the aircraft. A corporate jet might be transporting 15 to 18 people, and the service varies according to what the travelers need.

In terms of whom we hire, we prefer someone who has experience, simply because of the aircraft— they're valued at more than $20 million. So we deal with an elite group here. I know it's sort of a Catch 22. I don't rule out those who don't have experience, but if someone has a couple of years doing line service somewhere else, that person has a definite advantage.

We find that people who apply for line service are those who have a direct interest in aviation. Most are taking flight lessons or studying to become Airframe and Powerplant mechanics. The best place to start is at flight schools or FBOs that deal with small, general aviation airplanes. Work there to build experience being around aircraft. Then, get some contact with jets. Once you have experience dealing with jets, you can join an operation like ours.

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Aviation Career

GOVERNMENT CAREERS

GENERAL INFORMATION

Federal, state, and local government agencies are a major source of aviation jobs. The Federal Aviation Administration of the US Department of Transportation and a growing number of other Federal departments and agencies employ persons interested in civil aviation. All of these jobs come under the Federal Civil Service. Wage scales are determined by Congress, which periodically adjusts the pay levels to make them comparable to those in private business and industry.

The Federal Government is an Equal Employment Opportunity employer. Employees are covered by the Federal Employees' Benefits Program, which features liberal fringe benefits and salaries. Salaries for Federal Civil Service employees are established under two chief categories: General Schedule (for employees who perform administrative, technical, clerical, and professional jobs and who are paid on an annual basis) and the Federal Wage System (for employees who perform jobs associated with the trades and crafts and who are paid wages on an hourly basis).

Most Federal Civil Service employees in aviation are covered by the General Schedule, and their salaries vary by grade level (GS-l through GS- 15). Within each of the grades in the General Schedule, periodic pay increases are based on performance.

A normal work week is 40 hours. Additional payment (called premium pay) is made for shift work involving duty between 6 PM and 6 AM and for work during Sundays and holidays. Merit promotions may be gained under provisions of agency-developed merit promotion plans.

The vacation and sick leave policy is generous: employees earn from 13 to 26 days of paid annual vacation, depending upon the length of service, and 13 days of paid sick leave each year. In addition, health insurance, low-cost group life insurance, credit union service, and compensation and medical care for injury on the job are offered. Most Federal employees under the Civil Service participate in a liberal retirement plan.
Except for the Department of Defense, the Federal Aviation Administration has the most aviation jobs in the Federal Government. The FAA is charged with the administration and enforcement of all Federal Aviation Regulations to ensure the safety of air transportation. The FAA also promotes, guides, and assists the development of a national system of civil airports. The FAA provides pilots with flight information and air traffic control services from flight planning to landing.

AIR TRAFFIC CONTROL SPECIALIST (FAA)

Requirements for the Job

Applicants must have general or specialized experience. General experience is any progressively responsible work which demonstrates potential for learning and performing air traffic control work. The work can be administrative, technical, or other types of employment. Four years of college or any combination of education and experience equaling three years also are acceptable.

Specialized experience is military or civilian air traffic control work which demonstrates possession of the knowledge, skills, and abilities needed to perform air traffic control work.

Applicants who have passed the written test qualify for the experience requirements for GS-7 if they:

- *Hold or have held an appropriate facility rating and have actively controlled air traffic in civilian or military air traffic control terminals or centers;*
- *Hold or have held an FAA certificate as a dispatcher for an air carrier;*
- *Hold or have held an instrument pilot certificate;*
- *Hold or have held an FAA certificate as a navigator or have been fully qualified as a navigator/bombardier in the Armed Forces;*
- *Have 350 hours of flight time as a co-pilot or pilot and hold or have held a private pilot certificate or equivalent Armed Forces rating;*
- *Have served as a rated Aerospace Defense Command Intercept Director;*
- *Meet the general experience requirements and pass the written test with a high enough score to be considered for employment.*

Candidates must be able to pass a physical examination prior to appointment as an air traffic control specialist with the FAA. Thereafter, an annual physical examination is required. Employees are subject to random drug testing.

All applicants must pass a comprehensive written test and complete a personal interview during which their alertness, decisiveness, diction, poise, and conciseness of speech are evaluated. Because the unique skills necessary for success as a controller diminish with age, no one over the age of 31 is eligible to apply. For information on how to apply, contact the Aviation Careers Examining Division, Box 26650, Oklahoma City, Oklahoma 73126.

The FAA employs air traffic control specialists at air traffic control towers, at air route traffic control centers, and at flight service stations. Each of these jobs will be described in turn.

Controllers at FAA Airport Traffic Control Towers

Nature of the Work

Air traffic controllers have been described as "the guardians of the airways . "It is their function to direct air traffic so it flows smoothly, efficiently, and above all, safely. The tower controllers give pilots taxiing and takeoff instructions, air traffic clearances, and advice based on their own observations and on information from the National Weather Service, air route traffic control centers (ARTCCs), flight service stations, pilots, and other sources. They provide separation between landing and departing aircraft. They transfer control of aircraft to the ARTCC controller when the aircraft leaves their airspace, and they receive control of aircraft coming into their airspace from controllers at adjacent facilities. Air traffic controllers must be familiar with the aircraft identification and positions of the aircraft under their control, the aircraft types and speeds, and the location of navigational aids and landmarks in the area.

Working Conditions

Controllers normally work 40-hour-per-week shifts. They use radios, radar, electronic computers, telephones, traffic control lights, and other communication devices. Their responsibilities are divided into separate functions. A ground controller gives taxiing instructions and sometimes provides air traffic clearances to pilots who are on instrument flight plans or who will be flying through controlled airspace. At busy airports, these clearances are provided by a "clearance delivery" controller. Takeoff and landing instructions are issued by the tower controller. These duties are rotated among the staff about every two hours at busy locations.

Where the Jobs Are

FAA employs more than 12,000 controllers at approximately 400 towers. Some jobs are outside the contiguous United States in Alaska, Hawaii, Puerto Rico, the Virgin Islands, and American Samoa. A small number of controllers work for the Department of Defense and for the operators of non-FAA towers.

Wages

Trainees, or developmentals, are paid while learning their jobs. The starting grade is normally GS-7, for which the beginning salary is currently $23,678. The higher grades, ranging from GS-10 to GS-15, are for full-performance-level (FPL) positions located at the larger, more complex facilities, and the salaries at these grades range from $31,898 to $69,427. The GS-15 grade is limited to supervisors and managers in the largest facilities.

Opportunities for Advancement

Promotion from developmental to an FPL specialist depends upon satisfactory performance and progression in the training program.

Opportunities for Training

Trainees receive 9 weeks of initial screening and instruction at the FAA Academy in Oklahoma City, Oklahoma. If they successfully complete this training, they are assigned to a developmental position at a field location where they receive on-the-job training under close supervision. Those who successfully complete each phase of training progress to the next level until they become facility-rated. Those who fail any phase of training are separated from the FAA or reassigned to a non-controller position. The nature of the work requires that controllers complete proficiency training programs on an on-going basis. Any controller who moves from one facility to another must again receive on-the-job training and be recertified in the new facility.

Outlook for the Future

Prospects for employment will remain slim in the 1990's due to decreased hiring projections, shrinking budgets, and a stable workforce.

Candidates must be able to pass a physical examination prior to appointment as an air traffic control specialist with the FAA. Thereafter, an annual physical examination is required. Employees are subject to random drug testing.

All applicants must pass a comprehensive written test and complete a personal interview during which their alertness, decisiveness, diction, poise, and conciseness of speech are evaluated. Because the unique skills necessary for success as a controller diminish with age, no one over the age of 31 is eligible to apply. For information on how to apply, contact the Aviation Careers Examining Division, Box 26650, Oklahoma City, Oklahoma 73126.

The FAA employs air traffic control specialists at air traffic control towers, at air route traffic control centers, and at flight service stations. Each of these jobs will be described in turn.

Controllers at FAA Airport Traffic Control Towers

Nature of the Work

Air traffic controllers have been described as "the guardians of the airways . "It is their function to direct air traffic so it flows smoothly, efficiently, and above all, safely. The tower controllers give pilots taxiing and takeoff instructions, air traffic clearances, and advice based on their own observations and on information from the National Weather Service, air route traffic control centers (ARTCCs), flight service stations, pilots, and other sources. They provide separation between landing and departing aircraft. They transfer control of aircraft to the ARTCC controller when the aircraft leaves their airspace, and they receive control of aircraft coming into their airspace from controllers at adjacent facilities. Air traffic controllers must be familiar with the aircraft identification and positions of the aircraft under their control, the aircraft types and speeds, and the location of navigational aids and landmarks in the area.

Working Conditions

Controllers normally work 40-hour-per-week shifts. They use radios, radar, electronic computers, telephones, traffic control lights, and other communication devices. Their responsibilities are divided into separate functions. A ground controller gives taxiing instructions and sometimes provides air traffic clearances to pilots who are on instrument flight plans or who will be flying through controlled airspace. At busy airports, these clearances are provided by a "clearance delivery" controller. Takeoff and landing instructions are issued by the tower controller. These duties are rotated among the staff about every two hours at busy locations.

Where the Jobs Are

FAA employs more than 12,000 controllers at approximately 400 towers. Some jobs are outside the contiguous United States in Alaska, Hawaii, Puerto Rico, the Virgin Islands, and American Samoa. A small number of controllers work for the Department of Defense and for the operators of non-FAA towers.

Wages

Trainees, or developmentals, are paid while learning their jobs. The starting grade is normally GS-7, for which the beginning salary is currently $23,678. The higher grades, ranging from GS-10 to GS-15, are for full-performance-level (FPL) positions located at the larger, more complex facilities, and the salaries at these grades range from $31,898 to $69,427. The GS-15 grade is limited to supervisors and managers in the largest facilities.

Opportunities for Advancement

Promotion from developmental to an FPL specialist depends upon satisfactory performance and progression in the training program.

Opportunities for Training

Trainees receive 9 weeks of initial screening and instruction at the FAA Academy in Oklahoma City, Oklahoma. If they successfully complete this training, they are assigned to a developmental position at a field location where they receive on-the-job training under close supervision. Those who successfully complete each phase of training progress to the next level until they become facility-rated. Those who fail any phase of training are separated from the FAA or reassigned to a non-controller position. The nature of the work requires that controllers complete proficiency training programs on an on-going basis. Any controller who moves from one facility to another must again receive on-the-job training and be recertified in the new facility.

Outlook for the Future

Prospects for employment will remain slim in the 1990's due to decreased hiring projections, shrinking budgets, and a stable workforce.

Controllers at FAA Air Route Traffic Control Centers

Nature of the Work

Air traffic control specialists at FAA air route traffic control centers (ARTCCs) give aircraft instructions, air traffic clearances, and advice regarding flight conditions during the en route portion of flights. They provide separation between aircraft flying along the Federal airways or operating into or out of airports not served by a terminal facility. Center controllers use radar, or, in some cases, manual procedures to track the progress of all instrument flights within the center's airspace. Where radar coverage is available and their workload permits, controllers will also provide radar service to pilots who are not on instrument flight plans, alerting them to potential traffic conflicts. The controllers transfer control of aircraft to the controllers in the adjacent center or to the approach control or terminal when the aircraft enters that facility's airspace.

Working Conditions

Center controllers are required to use computer equipment, radios, radar, telephones, and other electronic communication devices. Shift and weekend work is necessary. Radar equipment must be operated in semi-darkness. Unlike
the controllers in airport traffic control towers, controllers in ARTCCs never see the aircraft they control except as "targets" on the radarscope.

Where the Jobs Are

The FAA employs about 10,000 controllers at 22 ARTCCs throughout the United States, Guam, and Puerto Rico.

Wages

The starting grade is normally GS-7 ($23,678). Trainees, or developmentals, are paid while learning their jobs. Grades range from GS-12 to GS-14 ($42,003 to a maximum of $59,022) for full-performance-level controllers. The grade is based on the complexity of the facility. Supervisors and managers in the more complex facilities can be graded as high as GS-15 (starting at $69,427 and reaching $90,252).

Opportunities for Advancement

Promotion to higher grades and to FPL controller positions depends upon performance and satisfactory achievement in the training program. Increases in grade are fairly rapid, with accompanying increases in salary for successful trainees.

Opportunities for Training

Trainees receive several weeks of initial screening and instruction at the FAA Academy in Oklahoma City, Oklahoma. After successful completion of the training period, they are assigned to developmental positions for on-the job training at one of the ARTCC locations. Like controllers at airport traffic control towers, ARTCC controllers, after they complete a particular phase of training, advance to the next phase or level until they are facility rated and become full-performance-level controllers. Those who fail to complete any phase of training are separated from the FAA or reassigned to non-controller positions.

Outlook for the Future

Consistent with predictions for continued growth of all sections of aviation, the need for center controllers will remain constant. In the 1990s, many controllers will be needed to replace those who retire or are promoted.

Controllers at FAA Flight Service Stations

Nature of the Work

The air traffic control specialists at the FAA's flight service stations (FSS) provide preflight, in-flight and emergency assistance to all pilots on request. They work with some pilots face-to-face at their facilities, and they also communicate with pilots by phone and radio. The specialists provide information about weather conditions for specific flights, receive and forward pilots' flight plans, relay air traffic control instructions, assist pilots in emergency situations, provide airport advisory service, and initiate searches for missing or overdue aircraft.

Working Conditions

Most flight service stations are located at airports, but because of advances in technology, this is not always necessary. The FSS system is being modernized. Existing flight service stations are being replaced with fully automated facilities. FSS specialists are required to work weekends shifts. They utilize telephones, radios, computers, weather radar, direction finding equipment, and other equipment in their work.

Where the Jobs Are

FAA flight service stations are at about 180 locations throughout the United States, Virgin Islands, and Puerto Rico. There are approximately 4,000 FSS specialists.

Wages

The starting grade is normally GS-7 ($23,678). Trainees, or developmentals, are paid while they learn. The full-performance-level grades range from GS-9 ($28,964) to GS-12 (a maximum of $54,601). Supervisors and managers in the busier, more complex facilities are graded from GS-10 ($31,898) to GS-15 (a maximum of $90,252).

Opportunities for Advancement

Specialists whose training progresses successfully attain higher grade levels as they gain experience and the complexity of their duties increase.

Opportunities for Training

Trainees receive 16 weeks of initial screening and instruction at the FAA Academy in Oklahoma City, Oklahoma. After successful completion of the initial training, they are assigned to developmental positions for on-the job training at their assigned facilities. Those who fail to certify on all required positions of operation are separated from the FAA or reassigned to other positions. Proficiency training is continuous, and specialists who move to a new facility must be recertified.

Outlook for the Future

Unlike air traffic control specialists at FAA towers and ARTCCs, specialists at flight service stations are not expected to increase in number. Automated Flight Service Stations in the future will serve larger areas. There will be a need, however, to hire replacements for the many flight service specialists who are expected to retire during this decade.

ELECTRONICS TECHNICIAN (FAA)

Nature of the Work

Electronics technicians install and maintain the electronic equipment required for air navigation, communications between aircraft and ground services, and control of aircraft movements to ensure safety in the air and smoothly flowing air traffic. Electronics technicians work with radar, radios, computers, wire communications systems, and other electronic devices at airports and along the network of Federal airways. Their work includes preventive maintenance (inspection of equipment, meter reading, replacement of deteriorating parts, adjustments) and corrective maintenance (trouble-shooting, repair and replacement of malfunctioning equipment). Electronics technicians may specialize in the design, development, and evaluation of new types of electronic equipment for the Federal airways.

Working Conditions

Technicians usually work in an Airway Facilities Sector Field Office at an airport. The equipment for which the Office is responsible is within a 30- or 40-mile radius of the airport in control towers, air route traffic control centers, or flight service stations. The equipment also can be in open fields and even on remote mountain tops. Some of the work is outdoors. A regular work week is 40 hours, with shift work and weekend work rotated.

Some FAA electronics technicians are appointed for airborne technical/electronics duty. They fly in government aircraft with airspace system inspection pilots during the flight inspection of navigational aids. Electronics technician applicants should indicate on their applications whether they are willing to fly in agency aircraft. The requirements and salary scales are basically the same as for other electronics technicians.

Requirements for the Job

Applicants must have general or specialized experience. General experience consists of an aptitude for math and science and a willingness to train on sophisticated FAA equipment.

Specialized experience includes:

- *Work as a technician, instructor, inspector, or mechanic (civilian or military) which shows progression in theoretical and practical knowledge of electronic theory, and of characteristics, function, operation, and capabilities of a variety of types of electronic equipment. This experience must have included the use of schematic diagrams, a variety of test equipment, and the application of appropriate electronic formulas involved in such duties as testing, troubleshooting, modifying, designing, calibrating, installing, maintaining, repairing, constructing, developing, instructing on electronic equipment, or similar functions.*
- *Experience in developing policies, standards, and procedures for maintenance, installation, or similar functions provided the work clearly shows that the applicant applied a specialized knowledge of the theories and principles of a variety of electronic systems or equipment.*
- *Experience doing bench repair of television and radio receivers in a commercial shop in which the applicant did troubleshooting on a variety of equipment and used such special test equipment as sweep generators, marker generators, oscilloscopes, and others normally employed in such servicing will*

be acceptable as specialized experience at GS-6 and below, if applicable to the work of the position.

Education may be substituted for experience as in the following:

- *GS-4: Successful completion of two years of study which include at least 12 semester hours in engineering, physical science, technology, or mathematics. At least 6 of the 12 semester hours must have been in electronics courses.*

- *GS-5: Successful completion of (a) all the requirements for the bachelor's degree in electrical engineering, electronics engineering or electronics technology; (b) three years of study in an accredited technical institute curriculum in electronics; or (c) a full 4-year course of study leading to a bachelor's degree which included major study or at least 24 semester hours in any combination of courses such as those listed for GS-4. At least 12 of the 24 semester hours must have been in electronics courses.*

Where the Jobs Are

The FAA employs more than 8,500 electronics technicians. Most of them work in field offices or "sectors" located all over the country. Some work at the FAA's Technical Center in Atlantic City, New Jersey. The Center is engaged in electronic research and development projects. They also work at the Aeronautical Center in Oklahoma City.

Wages

FAA electronics technicians normally start at GS-5 or GS-7 ($19,116 to $23,678), with advances to GS-11 ($35,045 to $45,561) and possibly higher.

Opportunities for Advancement

Employees can advance to higher grade levels depending upon the complexity of their duties, their knowledge and skills, and the degree of supervision received or exercised. Supervisory positions are available at field offices and regional offices.

AVIATION SAFETY INSPECTOR (FAA)

General Aviation Avionics Inspectors

Aviation safety inspectors develop, administer, and enforce regulations and standards concerning civil aviation safety. They assess (1) the airworthiness of aircraft and aircraft systems, (2) the competence of pilots, mechanics, and other personnel, and (3) safety aspects of aviation facilities, equipment, and procedures. These positions require knowledge and skill in the operation, maintenance, or manufacture of aircraft and aircraft systems.

Requirements to Enter These Jobs

All candidates for entry-level aviation safety inspector positions must meet the following minimum qualification requirements:

- *Not more than two separate incidents involving Federal Aviation Regulations violations in the last 5 years.*

- *Valid State driver's license.*

- *Fluency in the English language.*

- *No chemical dependencies or drug abuse which could interfere with job performance.*

- *High school graduate or equivalent.*

Specific requirements for the various types of safety inspector positions include:

Air Carrier Avionics Inspectors

Specialized Experience—all of the following:

- *Aircraft electronics work experience.*

- *Experience involving the maintenance and repair of avionics systems in large aircraft over 12,500 pounds gross takeoff weight.*

- *Aircraft avionics experience in a repair station, air carrier repair facility, or military repair facility.*

- *Three years supervisory experience in aircraft avionics as a lead mechanic or repair person who supervises others.*

General Aviation Avionics Inspectors

Specialized Experience—all of the following:

- *Work experience involving the maintenance and repair of aircraft avionics systems.*

- *Aircraft avionics experience with aircraft under 12,500 pounds gross takeoff weight.*

- *Avionics experience in a repair station, airline repair facility, or military repair facility.*

- *Three years supervisory experience in aircraft avionics as a lead mechanic or repairman who supervises others.*

Recency of Specialized Experience: Some aircraft avionics work experience must be gained within the last three years.

Air Carrier Maintenance Inspectors

Specialized Experience—all of the following:

- *Aviation maintenance work experience.*
- *Experience involving the maintenance and repair of airframes, powerplants, and systems of large aircraft over 12,500 pounds gross takeoff weight maintained under an airworthiness inspection program.*
- *Aircraft maintenance experience in a repair station, air carrier repair facility, or military repair facility.*
- *Three years supervisory experience in aviation maintenance as lead mechanic or repair person who supervises others.*

Recency of Specialized Experience: Some aviation maintenance work experience must be gained within the last three years.

Certificates and Ratings: FAA Mechanic Certificate with airframe and powerplant ratings.

General Aviation Maintenance Inspectors

Specialized Experience—all of the following:

- *Aviation maintenance work experience.*
- *Experience involving the maintenance and repair of airframes, powerplants, and aircraft systems with responsibility for certifying airworthiness.*
- *Maintenance experience with aircraft under 12,500 pounds gross takeoff weight.*
- *Maintenance experience in a repair station, airline repair facility, or military repair facility.*
- *Three years supervisory experience in aviation maintenance as a lead mechanic or repair person who supervises others.*

Recency of Specialized Experience: Some aviation maintenance work experience must be gained within the last three years.

***Certificates and Ratings*:** FAA Mechanic Certificate with airframe and powerplant ratings.

Air Carrier Operations Inspectors

Specialized Experience

- *Pilot experience in large multi-engine aircraft over 12,500 pounds gross takeoff weight.*
- *Minimum 1,500 total flight hours.*

Recency of Specialized Experience—all of the following:

- *Pilot-in-command in large aircraft (over 12,500 pounds gross takeoff weight) within the last three years.*
- *Minimum 100 flight hours in the last three years.*
- *Minimum 1,000 flight hours in the last five years.*

Certificates and Ratings: Airline Transport Pilot Certificate or Commercial Pilot Certificate with instrument airplane rating.

Other Requirements

- *Professional flying skill as demonstrated by successful completion of turbojet evaluation.*
- *Not more than two flying accidents in the last five years*

General Aviation Operations Inspectors

Specialized Experience

- *Pilot experience which provided a comprehensive knowledge of operations requirements, facilities, practices, procedures, and flight activities of aircraft.*
- *Minimum 1,500 total flight hours.*

Recency of Specialized Experience--all of the following:

- *Some aviation work experience within the last 10 years.*
- *Minimum 300 flight hours in the last three years.*
- *Minimum 1,000 flight hours in the last five years.*

Certificates and Rating of the following:

- *Airline Transport Pilot Certificate or Commercial Pilot Certificate with instrument airplane rating.*
- *Single and multi-engine land airplane ratings.*
- *Valid Flight Instructor Certificate with single and multi-engine airplane and instrument airplane ratings.*

Other Requirements

- *Professional flying skill as demonstrated in a flight check to Commercial Pilot Certificate with an Instrument Rating standard.*
- *Not more than two flying accidents in the last five years.*

Manufacturing Inspectors

Specialized Experience

- *Experience in the area of quality control/quality assurance systems, methods and techniques in the manufacture of aircraft, aircraft engines, propellers, or Class II products which demonstrates the ability to determine that aircraft and related products meet the approved design criteria or the design criteria on which approval is being sought and are in condition for safe operation.*
- *Experience involving either the actual issuance of or having responsibility for managing programs leading to the issuance of original airworthiness certificates or original export airworthiness approvals for aircraft, aircraft engines, propellers, or Class II products.*
- *Experience involving a combination of the above.*

Working Conditions

Considerable travel is required since inspections, consultations, and investigations must be made at various facilities and locations or at the scenes of accidents. Forty hours constitute a normal work week. Change of assignment from one duty station to another is required as staffing demands.

Where the Jobs Are

Inspectors operate out of nationwide Air Carrier District Offices, General Aviation District Offices, and Flight Standards District Offices. Five international offices have the same functions as the Flight Standards District Offices.

Wages

Salaries range from GS-9 ($28,964 to $37,651) to GS-15 ($69,427 to $90,252).

Opportunities for Advancement

Outstanding inspectors may be promoted to the next higher level with increased responsibilities and salary. Inspectors who demonstrate managerial ability may become a section or branch manager or an instructor at the FAA Academy in Oklahoma City.

Outlook for the Future

Since economic deregulation of the airlines in the 1970s, Congress has stressed the need for more aviation safety inspectors. For more information on how to apply for safety inspector positions., contact the Aviation Careers Examining Division, Box 26650, Oklahoma City, Oklahoma 73126.

AIRSPACE SYSTEM INSPECTION PILOT (FAA)

Nature of the Work

Airspace system inspection pilots conduct in-flight inspection of ground-based air navigational facilities to determine if they are operating correctly. They fly multi-engine, high-performance jets with ultra-sophisticated, computerized, and automated electronic equipment. These "flying electronic laboratories" record and analyze facility performance, and they report potential hazards to air navigation for correction. The flights are made during the day and night, and under visual and instrument flight rules. Pilots assist in accident investigations by making special flight tests of any FAA navigational aids involved. Although most of their work is with the FAA employees who maintain the "navaids," airspace system inspection pilots also are in touch with other aviation interests regarding the installation, operation, and use of their navigational facilities.

Working Conditions

The job requires considerable travel. The flights cover navigational aids supporting Federal airways and civil and military airports throughout the United States. The basic work week is 40 hours.

Requirements for the Job

Experience as a pilot in general aviation or air carrier or military aviation is required. Experience requirements are specified in terms of flying time, certificates and ratings,

rather than in number of years of experience. All applicants must hold a valid commercial pilot certificate with a multi-engine rating and instrument ratings.

	Total Time	Pilot-In Command	Mutli-Engine	Instrument/Night	Last 12 Months
GS-9	1200	250	100	100	100
GS-11	1500	250	500	150	100

Flying time in any category may be as pilot or co-pilot, except for the pilot-in-command hours specifically required. The instrument/night requirement must include at least 40 hours of actual instrument weather time. Experience as an air traffic controller, chief test pilot, chief pilot of an FAA-certificated flight school, or designated pilot examiner may be substituted for not more than 50 hours of the flying time required for the last 12 months. The pilot must have a first-class FAA medical certificate and periodically be re-examined to maintain employment in this job.

Where the Jobs Are

Pilots work out of one of the seven Flight Inspection Field Offices in the contiguous 48 states. Upon reaching the full performance level of proficiency, pilots can bid on jobs in Alaska, Hawaii, Tokyo, or Germany.

Wages

Salaries range from GS-9 ($29,898 to $38,869) to GS-12 ($43,356 to $56,362).

Opportunities for Advancement

A trainee can advance to the job of second-pilot on an inflight inspection of air navigation facilities. The next step is to become a supervisory airplane pilot who oversees the flight inspection crew and evaluates the report findings on navigation systems. If assigned to a Flight Inspection Field Office, the employee can advance from the position of second-pilot to airspace and procedures specialist responsible for developing instrument approaches and terminal and enroute air traffic procedures. Or the pilot may move up to become a senior flight inspector and aircraft commander, supervising flight crews and results of inspection missions. Managers of the field Offices hold the top jobs.

Opportunities for Training

Flight instruction may be obtained from private or university-operated flight schools or from the military services. For more information on applying to become an airspace system inspection pilot, contact the Aviation Careers Examining Division, Box 26650, Oklahoma City, Oklahoma 73126.

FLIGHT TEST PILOT (FAA)

Nature of the Work

FAA flight test pilots check the airworthiness of aircraft through inspection and flight testing. They evaluate flight performance, engine operation, and flight characteristics of either prototype aircraft or modifications of production aircraft and aircraft components that are presented for FAA certification. Flight test pilots supervise FAA-designated flight-test representatives and participate in investigations of accidents and violations of the Federal Aviation Regulations.

Working Conditions

Flight test pilots fly new aircraft under all kinds of conditions to test their performance. Considerable travel is necessary, and duty stations may be changed from time to time as circumstances require.

Requirements for the Job

Three years of general experience as a pilot or co-pilot in any civilian or military major aircraft operation is required. Also required is one to three years of special experience in the aircraft manufacturing industry or in the military or civil service of the Federal Government as a flight test pilot, aeronautical engineer, or flight test engineer. The special experience must include engineering flight testing of experimental types of aircraft or solving technical engineering problems at a professional level. The pilot must have experience in obtaining and evaluating data related to flight performance, flight characteristics, engine operation, and other performance details of the prototype or modifications of production aircraft. The higher entry grades require completion of a flight test pilot course, such as a military flight test school or the FAA flight test pilot course. College study in engineering (aeronautical, electrical, electronic, or mechanical), mathematics, or physics may be substituted for some of the general experience requirements. Also required are a first-class FAA medical certificate plus 1,500 to 2,000 hours of flight time, a commercial pilot certificate, and single engine, multi-engine, and instrument ratings. Test pilots must pass physical exams at regular intervals to keep their jobs.

Where the Jobs Are

The jobs are where there are aircraft manufacturing plants (chiefly California, Washington, Missouri, Maryland, Texas, Kansas, Florida, and New York).

Wages

The entry-level grade usually is GS-9. The starting salary will depend on the degree of the applicant's experience and training.

Opportunities for Advancement

A flight test pilot may be promoted to a branch manager position in the engineering or manufacturing area. There also are opportunities for advancement to administrative posts at FAA Headquarters or at FAA Technical Center (the research and development arm of the Federal Aviation Administration).

Opportunities for Training

Advanced flight training at a military flight test school may be obtained in the military service. Flight training through commercial pilot certificate with appropriate ratings may be obtained from private or school-connected flying schools and institutes. Candidates with flight training and a college degree in aeronautical engineering are preferred.

MAINTENANCE MECHANIC (FAA)

Nature of the Work

FAA maintenance mechanics maintain aids to navigation such as the approach-light systems serving airport runways. They also work on the structural, electrical, and mechanical devices that are major parts of other facilities. Their work includes maintenance and repair of heating, air conditioning, ventilating, electrical generating, and power distribution systems. They also maintain and repair the buildings and antenna structures that house a wide variety of FAA facilities. FAA maintenance mechanics are classified under the Federal Wage System schedule. They perform jobs associated with the trades and crafts and are paid on an hourly basis. The work can involve carpentry, painting, plumbing, and masonry construction, as well as repairing and maintaining electrical equipment.

Working Conditions

The work can be indoors or out. It may be on outdoor structures as high as 300 feet. The basic work week is 40 hours. The employee must be able to drive a truck to jobs in outlying areas.

Requirements for the Job

The applicant must have four years of progressively responsible experience in two or more of the following occupational groups: machinist, machine repairperson, automobile mechanic, carpenter, woodworker, electrician, electric motor repairperson, painter, air conditioning and refrigeration repairperson, heating equipment, and power generating repairperson. Training in a trade school may be substituted for some of the required experience. The candidate also must have a driver's license.

Where the Jobs Are

The jobs are in the United States, Puerto Rico, the Virgin Islands, and anywhere else that the FAA has air navigational aids and air traffic control towers and centers.

Wages

Hourly wages vary according to experience and the prevailing rates where the jobs are located.

Opportunities for Training

Training can be acquired in high school industrial arts classes and in vocational or technical schools.

ENGINEER

General Information

The FAA, the National Aeronautics and Space Administration (NASA), and the Department of Defense employ engineers of all specialties to work on research an development problems in aviation. These engineers work on V/STOL (vertical short takeoff and landing aircraft, aircraft noise, the sonic boom, hypersonic aircraft, and new equipment and devices to increase aviation safety. Engineers also provide guidance in airport design, construction, operation, and maintenance.

Nature of the Work

The facilities, devices, and machines needed by the Federal Aviation Administration to carry on its work require the services of aeronautical, electrical, electronic, mechanical, and civil engineers.

Aerospace (Aeronautical) Engineers develop, interpret, and administer safety regulations relating to airworthiness of aircraft and their accessories. They analyze and evaluate manufacturers' designs, set up test procedures, observe tests, and then advise manufacturers. They deal with problems such as vibration, flutter, stability, control, weight, balance, and aerodynamic characteristics.

Electrical Engineers deal with power supply, distribution, and standby power generation required for the operation of air navigational aids . They also help design and evaluate airport and runway lighting and electrical equipment aboard aircraft.

Electronic Engineers design improved electronic navigational aid and communications systems. They may design, develop, modify, or oversee installation, calibration and maintenance of ground and airborne electronic equipment. They also recommend where these aids should be located.

Mechanical Engineers are concerned with the design of gasoline and diesel powerplants for standby power generation in case of emergencies. They are also concerned with heating, ventilating, and air conditioning equipment at FAA installations. Some mechanical engineers check out such things as the performance of new types of aircraft engines, fuel systems, and fire detection devices.

Civil Engineers in the FAA's airports program handle a broad range of airport design, construction, and maintenance matters. The FAA provides advice and guidance to developers of civil airports, particularly those developed with Federal grants-in-aid.

Working Conditions

Engineers work 40 hours a week at a desk in an engineering laboratory or outdoors where they conduct or observe tests of equipment. Travel may be required. Engineers consult with aircraft and engine manufacturers and with suppliers of all kinds of equipment related to the engineer's specialty. Engineers also may travel to consult with state and city officials who need Federal funds for building or improving airports and to military bases where equipment is tested.

Requirements for the Job

A Bachelor of Science degree in engineering is required, or four years of technical engineering experience and training that provide knowledge equal to that possessed by a graduate engineer. Up to eight additional years of experience are required, depending upon the grade level of the job.

Where the Jobs Are

Engineering jobs are located at FAA Headquarters and district and regional offices; NASA Headquarters and centers; and at certain military bases throughout the Nation.

Wages

GS-5 ($19,732) to GS-14 ($60,925) are beginning salaries, depending upon previous experience and educational background.

Opportunities for Advancement

Promotion is normally from within the FAA.

Opportunities for Training

Training may be obtained from colleges offering engineering courses. For information on applying for engineering positions, contact the Aviation Careers Examining Division, Box 26660, Oklahoma City, Oklahoma 73126.

ENGINEERING AID AND ENGINEERING TECHNICIAN

Nature of the Work

Depending upon the specialty, engineering aids and technicians assist engineers by drafting engineering plans, conducting efficiency and performance tests, making calculations, setting up laboratory equipment and instruments, and preparing technical reports, specifications, and estimates.

Working Conditions

The basic work week is 40 hours. Travel may be required. Engineering aids and technicians sometimes consult with aircraft and engine manufacturers and with state and city officials who need Federal funds for building or improving airports. They also may visit military bases where equipment is tested.

Requirements for the Job

Specialized Experience

Examples of occupations which may have provided qualifying specialized experience include draftsman, surveying technicians, construction estimator, physical science, and mathematics technician.

Experience in a trade or craft may be credited as specialized experience when the work provided intensive knowledge of engineering principles, techniques, methods, and precedents. Examples are trade positions with substantial developmental, test, or design responsibilities, such as: planner and estimator who analyzed designs for production purposes, or instrument-maker or model-

maker who performed design or development work on devices fabricated.

Education may substitute for experience. At the GS-3 level, successful completion of one year of study which included at least six semester hours in any combination of courses such as engineering, engineering or industrial technology, construction, physics, drafting, surveying, physical science, or mathematics. At the GS-4 level, successful completion of two years of study which included at least 12 semester hours in any combination of courses such as those listed for the GS-3 level. At the GS-5 level, successful completion of a full four-year course of study leading to a bachelor's degree with (a) a major study in an appropriate field of engineering, construction, or industrial technology; or (b) which included at least 24 semester hours in any combination of courses such as those listed for the GS-3 level.

Where the Jobs Are

The jobs are located at FAA facilities and at FAA's Technical Center at Atlantic City, New Jersey, at NASA headquarters and centers, and at certain military bases throughout the nation.

Wages

The starting salaries for engineering aids are GS-l ($12,406) to GS-3 ($15,221) and for engineering technicians GS-4 ($17,086) to GS-12 ($42,003), depending upon previous experience and educational background.

Opportunities for Training

The technician or aid may study a specialty at a vocational or technical school, junior or community college, or a four-year college.

OTHER FAA JOBS

The FAA employs not only engineers but many other professionals. These include airport safety specialists, urban planners, economists, mathematicians, statisticians, program officers, management analysts, budget analysts, and even physicians.

The FAA has a limited number of jobs for physicians who specialize in aviation medicine.

These physicians study the effects of flying on the human body, the effects of fatigue on a pilot's performance, the need for oxygen above certain altitudes, the tension and stress factors associated with the air traffic controller's job, and the standards of the various classes of medical examinations required for pilots and other flight crew members.

The FAA needs logistical support for all its programs, particularly in the establishment, operation, and maintenance of air navigation and air traffic control facilities. It employs logistics program planners and managers, real property specialists, inventory and supply managers, procurement analysts, contracting specialists, transportation officers, and purchasing clerks.

The FAA also employs lawyers to write Federal Aviation Regulations, to interpret them, and to represent the FAA in legal controversies. It also employs accountants, public information officers, librarians, photographers, and support personnel (such as receptionists, secretaries, typists, office machine operators, mail room clerks, and computer programmers and operators).

AVIATION JOBS WITH THE MILITARY

The US military services employ numerous civilians for jobs in aviation, such as aircraft mechanics, engineers, technicians, and general office workers. These civilian jobs come under the Federal Civil Service. Employees do many of the same kinds of work and receive the same wages and benefits as their counterparts in the FAA or other Federal departments and agencies.

There are many aviation career opportunities for men and women in the military services as enlisted personnel and Officers. The Air Force offers the greatest number of opportunities to fly as a pilot or to work as an aircraft mechanic, air traffic controller, electronic technician, flight nurse, meteorological technician, or in other posts. The Navy and Marine Corps have counterpart aviation jobs to those in the Air Force. The Army operates and maintains of helicopters and subsonic light planes. It requires flight crews, ground service people, and weather specialists to support its aerial operations. Many of these military aviation jobs are excellent preparation for similar jobs in civilian life. For example, a high percentage of airline pilots received their principal training and experience in the military.

OTHER FEDERAL GOVERNMENT JOBS IN AVIATION

Many other Federal Government departments, bureaus, and agencies operate aircraft to carry on their work more effectively. For example, the Fish and Wildlife Service of the Department of the Interior uses aircraft for taking a census of wildlife. The US Forest Service of the Department of Agriculture uses aircraft to check on aerial forest spraying contracted to commercial operators or to oversee

forest firefighting procedures. The Immigration and Naturalization Service of the Department of Justice uses aircraft to detect people entering the United States illegally. And the US Coast Guard operates aircraft for search and rescue purposes.

Although pilot and mechanic jobs in these agencies are comparatively few in number, they are mentioned to complete the full picture of aviation career opportunities within the Federal Civil Service. Pilots for these Federal agencies fly single-engine or multi-engine aircraft over all kinds of terrain in all kinds of weather. Pilots must have between 1,200 and 2,500 hours of flying experience, including extended cross-country flights over land and water during which they perform their own navigating. They must be able to pass a First Class or a Second Class FAA physical examination every 6 to 12 months, respectively.

Federal Government jobs in aviation are located throughout the country. The annual salary ranges from GS-9 to GS-12, depending upon experience and educational background.

AVIATION JOBS WITH THE NATIONAL TRANSPORTATION SAFETY BOARD

Accident investigators with the National Transportation Safety Board (NTSB) interview survivors and witnesses and examine aircraft parts, instruments, and engines. They also review maintenance and flight records to determine the probable cause of airplane accidents. Aviation-related engineering, medical, or operational experience is required for a variety of professional positions with this safety-related organization. Travel and field work typify the NTSB investigator's job. Salary and experience rankings resemble those of the Department of Transportation.

For further information on applying for positions with the National Transportation Safety Board, contact the Personnel and Training Division, NTSB, 800 Independence Avenue, SW, Washington, DC 20594.

NATIONAL WEATHER SERVICE METEOROLOGIST AND METEOROLOGICAL TECHNICIAN

The aviation industry is one of the largest consumers of weather information. Flight and weather are so interrelated that many people view the meteorologist as a member of the aviation team. Thus, the meteorologist deserves mention in any discussion of jobs in aviation, even though what the meteorologist does is not, of course, entirely for the benefit of the aviation industry.

Nature of the Work

Meteorologists who work most closely with aviation are operational, or synoptic, meteorologists (as contrasted to meteorologists who work in theoretical or applies meteorological research). They are the forecasters who provide the day-to-day, hour-to-hour observations, analyses, forecasts, warnings, and advice to pilots, airport operators, and airlines. Meteorologists report weather conditions expected at airports, current conditions, and they make enroute forecasts. One of their main tasks is to interpret the meteorological data provided by weather instruments.

At a small weather station, the meteorologist may be expected to make outside weather observations, read and record data from weather instruments, check weather data coming in via a machine, draw weather maps, plot the weather, provide forecasts, and advise pilots and other interested parties. At large stations, meteorologists may specialize in one or more of these duties, relying to some extent upon computerized data to produce a forecast. They send forecasts via teletype or telephone to FAA Flight Service Stations, airline dispatch offices, airports, and to other consumers of weather information. Meteorologists frequently advise pilots who are preparing flight plans.

Working Conditions

Meteorologists work indoors, sitting or standing at map tables while studying weather maps and charts. They read data from weather instruments such as anemometers, thermometers, barometers, theodolites, ceilometers, radiosondes, and weather balloons. They must be able to operate a teletypewriter.

To check weather instruments and make observations, meteorologists also must work outdoors for short periods. They may work alone at a small station or with other meteorologists and meteorological technicians at a large station.

The work week is usually 40 hours. Overtime is required when the weather deteriorates . At stations open 24 hours a day, shift work is required. Meteorologists may be required to relocate to fill staffing requirements at another station or to advance in GS grade.

Requirements for the Job

One of the following two is required:

(1) A full course of study, leading to a bachelor's degree at an accredited college or university, which has included or been supplemented by 20 semester hours in meteorology (including six semester hours in weather analysis and

forecasting and six semester hours in dynamic meteorology). In addition, differential and integral calculus and six semester hours in college physics are required.

(2) At least 20 semester hours in meteorology at an accredited college or university that offers six semester hours in weather analysis and forecasting and six semester hours in dynamic meteorology. Also required are differential and integral calculus and six semester hours in college physics, plus additional appropriate education or technical experience which, when combined with the education prescribed above, will total four years of education or education and experience. This pre-professional background must be of such quality that it provides a body of knowledge and abilities comparable to that normally acquired through the successful completion of a full course of study described in paragraph (1).

Where the Jobs Are

The largest employer of Federal Government meteorologists is the National Weather Service. Several thousand Weather Service meteorologists work at approximately 300 stations throughout the 50 states, in Puerto Rico, in Arctic regions, and at Wake Island and other Pacific Ocean sites. National Weather Service Stations are located at airports or in large cities. A smaller number of Federal Government meteorologists work for the Air Force, Navy, Army, the FAA, NASA (the National Aeronautics and Space Administration), and the US Forest Service.

To assist meteorologists, the Weather Service employs meteorological technicians. Most of the job vacancies for this position are filled by applicants who received their technical training during active duty in the Armed Forces. The meteorological technician performs semiprofessional and scientific work, calibrating and using instruments for taking various kinds of measurements, observing, recording, computing, processing, classifying, and disseminating weather data.

Wages

The starting salary GS-5 ($19,732) to GS-15 ($71,664). The starting salary and grade is determined by the applicant's education and experience.

Opportunities for Advancement

Promotion to higher grades depends upon education, ability, work performance, and job openings. In-grade pay increases are made on the basis of experience and performance. With an increase in grade comes increased responsibilities as assistant chief or chief of a weather station or region. A few high-level administrative jobs may become available as vacancies occur.

Opportunities for Training

More than 20 universities offer bachelor degrees in meteorology. Others offer a major in meteorology. Training as a meteorological technician can be obtained while on active duty with the Armed Services and at some junior or community colleges and institutions. The National Weather Service operates a Technical Training Center in Kansas City, Kansas for the purpose of upgrading the skills of meteorologists and meteorological technicians.

Outlook for the Future

The science of meteorology is expanding and so are occupational opportunities. The National Weather Service expects to hire annually at least 100 meteorologists with a Bachelor of Arts degree to fill new positions and vacancies. Opportunities for military careers in meteorology are excellent, and competent military meteorologist Officers can receive advanced degrees at the government's expense. At present, the number of qualified students obtaining degrees in meteorology are fewer than the number needed to supply future expected demands. Although the demand is small, so few are entering the occupation, that job opportunities are available for the qualified applicant.

STATE AVIATION JOBS

Almost every state has an aeronautics department or commission that consists of a small number of aviation minded men and women, usually appointed by the Governor. These commissions make policies about aviation activities within the state. In some cases, persons appointed may not be considered employees and may be paid only expenses connected with their attendance at meetings. If the state's department or commission is well funded, it will address issues concerning flight safety and airport design and operation, as well as promotion of aviation activities in the state.

Frequently, employees have dual responsibilities, especially when the staff is small. Qualifications and requirements for these jobs are determined by state law; however, the top-level employees (safety officers, field service representatives, and engineers) must have experience and training in their specialty. Most employees in state civil service jobs receive retirement plans, social security, low-cost insurance, and medical services. Department employees usually work in the state capital Office.

Following is a list of typical state aviation jobs. Not all states offer all of these jobs, and salaries vary from state to state. For specific information, contact the Aeronautics Department in the state where you would like to work.

STATE AVIATION JOBS

Nature of the Job	Nature of the Work
State Director	Promotes aviation in the state; administers state aviation regulations; represents the state at regional meetings; and directs the staff of the Department of Aeronautics.
Deputy and/or Assistant Director	Assists the Director.
Administrative Assistant	Handles the detailed routine operation of the Director's office.
Pilot	Fly state-owned aircraft (for example, to take the Governor to meetings.) Departments that do not employ pilots may require the Director, his/her assistant, or some other staff member to assume pilot duties.
Field Service	Maintain direct contact with aviation interests in the state. May be called upon to explain Representatives flying rules, to help with aircraft sound problems, and to assist with aviation education projects.
Accountants and Statisticians	Maintain financial records of the Department of Aeronautics and gather flight statistics about aircraft movements, registered pilot accidents, hours flown, etc.
Stenographers, Clerks, and Typists	Perform routine office duties.
Engineers	Plan airports and improvements to airports; install and supervise air navigational aids operated by the state.
Chief Planners	Prepare the state's airport system plan and are active in other planning activities.
Engineering Technicians and Aids	Assist engineers in their work (draftsperson, etc.)
Aeronautical Inspectors	Check compliance with state aviation regulations.
Aviation Education Officers	Carry out aviation education policies of the Department; cooperate with schools in aerospace education programs.
Publication Editors	Publish newsletters, press releases, and other information of interest to pilots, airport operators, and fixed base operators in the state.
Safety Officers	Promote aviation safety by conducting weather seminars and other safety-related meetings for pilots.
Aircraft Mechanics	Service and maintain state-owned aircraft.
Surplus Property Manager	Search out surplus Federal Government property that might be useful to state aviation.

OUTLOOK FOR AVIATION CAREER OPPORTUNITIES IN GOVERNMENT

The outlook for growth in aviation career opportunities with the Federal Government is mixed. Increased automation, along with concern about budget deficits, will tend to keep employment levels static.

It should be pointed out, though, that normal attrition from retirements, will allow hiring to continue at its present pace for the foreseeable future. Current emphasis on decreasing Federal participation in the economy will mean that Federal aviation employment will not expand as much as civil aviation employment.

The future of civilian aviation careers with the military services is uncertain because the demand is very responsive to world conditions. Predictions indicate at least a small increase in these military jobs over the next 10 years.

Employment in aviation at the state government level will likely show an upward trend as aviation activities within the state grow in proportion to decreases in Federal activity.

A Meteorologist Talks About His Job

Arthur Lasard works for the National Weather Service. He is the Area Manager for Southern California and the meteorologist in charge of the forecast office for Southern California.

I've been interested in meteorology all my life. During the Korean War, when they began drafting people and putting them into specialties, I was placed into a weather specialty, and I've been there ever since.

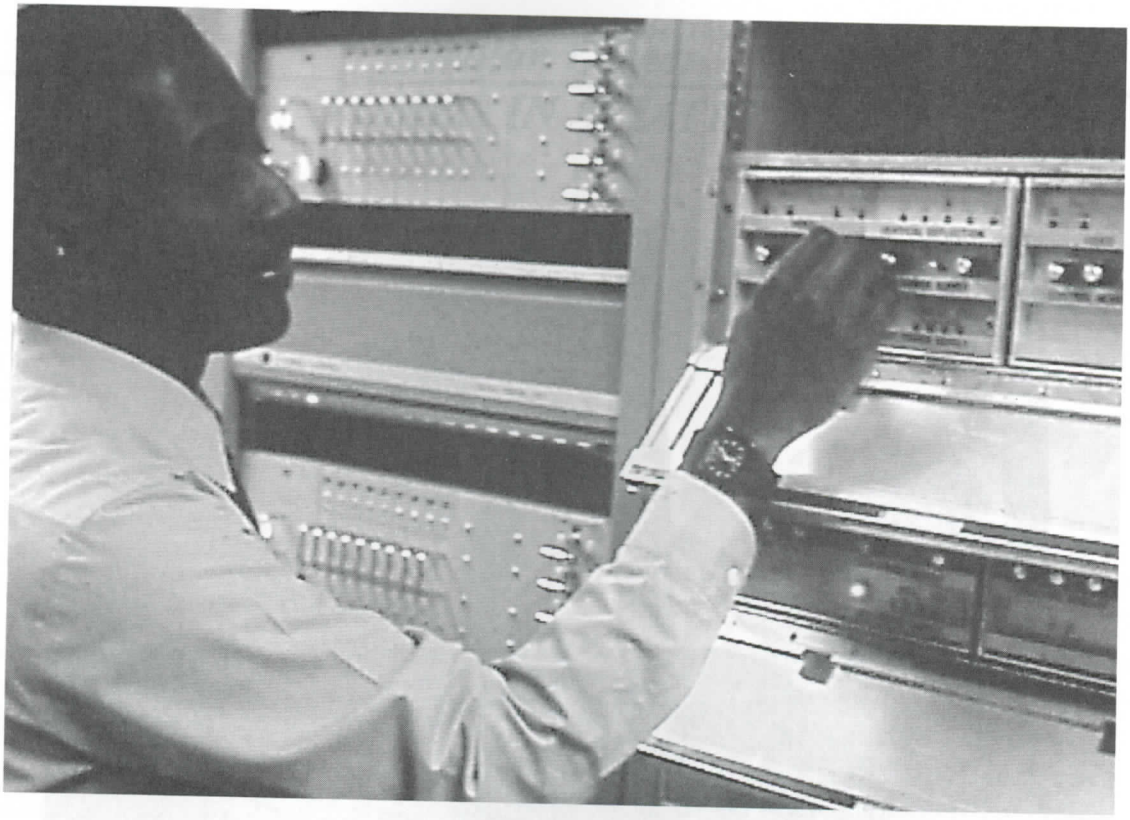
So, while it was essentially forced upon me, this occurrence was actually fortuitous, because I've always liked weather, and it was one of my choices even before going into the service. I'm no longer a field meteorologist working the desk; instead I serve as the overall supervisor of all weather service activities in Southern California, where I manage several weather offices.

What meteorologists do is gather information and analyze it to project the weather forecast for one to five days, or five to 10 days ahead of time. Information comes from aircraft who do position reports; winds; and from ships traveling the sea lanes.

We also receive reports from stationary observers in many locations in the continental United States as well as worldwide. We get information from aircraft, satellites, and from automatic weather stations in wilderness areas.

Forecasts are issued in three groups daily. Within that group are certain specified airports. For example, in this office, we forecast for Los Angeles International, San Diego, Palm Springs, and a dozen more airports. Flying crews coming in from all over the United States need current weather at all times. This information is relayed to pilots on at least an hourly basis, and forecasts are issued three times a day. This is a good, challenging job.

Someone considering a similar career must realize that preparation begins as early as grade and junior high school. You need a Bachelor of Science degree in atmospherics, physics, or mathematics. These degrees demand a lot of work, so the earlier you get started, the better. In my many talks to various schools, I stress the importance of science and math at an early age as preparation for any university program.



U.S. Department
of Transportation

**Federal Aviation
Administration**

Aviation Career
WOMEN IN AVIATION

Aviation Career — Women in Aviation

In the pages that follow, you'll hear from women who have successfully pursued a variety of interesting and rewarding aviation careers.

Emily Howell Warner was the first woman to fly with a major US jet airline. She is now Aircrew Program Manager with the Federal Aviation Administration.

When I was 18 years old, I thought I wanted to be a stewardess, so I decided to try flying. I bought a ticket on Frontier Airlines and I went as a passenger. I asked the stewardess if I could go forward; in those days, security was not as tough. As soon as I went through that cockpit door, I just knew that was what I wanted to do.

I rode in the jump seat all the way back, and it was really great. It was a beautiful Colorado blue-sky morning and everything just hit me all at once. On my next day off from my job, I took the bus out to the airport and looked up the Clinton Aviation Company, talked to an instructor, and signed up for flying lessons. I was making $38 per week at the time, and my flying lessons were $12.75 per hour. I could only afford one lesson a week. Within about six months, I had a job at the airport as a receptionist for Clinton Aviation, and later became a flight instructor.

I instructed from 1961 until 1973. I was an instructor, an instrument instructor, and I got to multi-engine instructor. I became an assistant chief pilot for the school. I ended up being the flight school manager.

At one time when I was managing the flight school, we had 500 students and 32 flight instructors. I was in charge of them all. I was also a designated FAA pilot examiner. By about 1967 or 1968, I had enough flight time to be an airline pilot. I was not sure if it was a woman's place to be in the cockpit of an airliner, but I went ahead and started applying. I picked three airlines: Frontier, United, and Continental.

From about 1967 to 1972, there were a lot of things happening in the country. The women's movement was on, along with equal opportunity and equal age rights. By 1969, my whole attitude had changed. I thought I was entitled to be considered as a pilot.

I talked to the chief pilot at Frontier one time and he said that he knew I had applied and there were about 3,000 applications. He said, "I do not know if an airline will ever hire a woman, but if I were you I would get some more multi-engine time and get my airline transport rating." I took his advice and did just that. In 1969, I hit 30 years old and thought I was over the hill. But they could not discriminate because of age.

I kept plugging along. In September, 1972, one of my instructors came to me and said, "Emily, I just wanted to let you know that Frontier is hiring again and I had an interview. I think I have a good chance to get hired." I said, "Good for you, John, go for it."

Then I started thinking about it. He was a year younger than I, had less time, and he had an interview. I really upped my campaign, re-did my application, went over to Frontier and literally camped on their doorstep from September to January. I was over there every two weeks. They started to know me by name, but I never got a call for an interview.

Finally, a friend who works for Frontier called me in the first part of January and said, "Emily, they are going to hire a class and your name came up and it was just like a hot potato." Well, he got me in to see Ed O'Neill, vice-president of flight operations.

I talked to Mr. O'Neill for about 40 minutes. The next morning at Clinton, I got a call from the personnel office and they said they wanted to interview me. I flew the Convair 580 simulator for them. They were trying to talk me out of the job. They said I wouldn't like it. It's hard work. You're gone a lot. Why don't you sell real estate or something? I just looked at Mr. O'Neill and said, "I know I can do it." I said it to him twice. He said, "Okay, but think about it."

He wanted it to be good for me, good for women, and good for the airline. He wanted it to be successful. The next morning I called him and said that I still wanted the job. I got hired.

I started out as a second officer in a Boeing 737. I progressed to the De Havilland as a co-pilot and flew what we call the high line up through Montana. From there I went to the Convair 580 as a co-pilot. Then I went back to the De Havilland as a captain. I flew that for a year or so, and then it was getting close to the jets, so I went back to the Convair to get some more heavy time. Then I got into the right seat of the 737 as co-pilot for about three years, and then I moved over to the left seat as captain.

Frontier shut down in August of 1986 and we were picked up eventually by Continental. I flew with them for about 13 months, and I could see I would probably never see the left seat there because of the seniority system.

I was hired by UPS in March of 1988 as a captain on a 727. I spent about two-and-a-half years there, commuting

to Louisville, Kentucky. I really liked the flying and the company. But the night flying and turning the clock around on myself got to me. My family missed out; I was gone a lot.

One morning, I met up with a former Frontier pilot who had become an FAA inspector. We talked about his job, I got interested, and applied. Six or seven months later, I got a job offer and decided to take it. I had always been interested in the FAA, and thought this would be a good way for me to end my career. I've really enjoyed it.

I think any career, whether it is being a teacher, or a doctor, or a lawyer, or whatever, takes dedication. Don't lose sight of your goals, even if they change along the way. I went from general aviation to airline pilot. I thought I would be an airline pilot all my life. That didn't work out, so I kind of changed my views and it has worked out fine.

Persistence! Stick with what you like to do and try to keep learning. Keep that door or window of opportunity open all the time. Networking is important in any field that you are in. A little good luck does help!

Amy M. Carmien is president and publisher of the magazine *Women in Aviation* (not connected with this publication).

I began my aeronautical career with flight lessons at age 16. Following high school, I attended Embry-Riddle Aeronautical University at Daytona Beach, Florida, where I earned degrees in Aviation Maintenance Management, Aviation Business Administration, and Aviation Maintenance Technology. In addition to my pilot certificate, I have an airframe and powerplant (A&P) mechanic certificate.

While at Embry-Riddle, I was awarded an Aviation Maintenance fellowship. Through the fellowship program, I assisted in the instruction of engine installation and troubleshooting. During this same time, I participated in the National Transportation Safety Board's student co-op program. Both of these programs allowed me to continue my education while gaining practical aviation experience.

Throughout my education, I've been involved with writing and journalism courses. For me, journalism provides a positive balance with the more technical aspects of aviation.

After working with the NTSB and as an A&P mechanic, I began researching the idea of an aviation publication devoted to the accomplishments of women in the field. That research led to the publication of Women in Aviation.

The primary purpose of Women in Aviation *is to acknowledge contributions from women in all sectors of aviation, regardless of their flight or non-flight status. Our subjects have included, in addition to pilots, an all female skydiving team, a naval aviator, a balloon captain, and an A&P mechanic. The magazine also has a book review section, a student spotlight feature, and a flight anecdote column.*

In addition to my Women in Aviation *activities, I serve as an advisor to the International Women's Air and Space Museum at Centerville, Ohio. I edit the museum's Quarterly newsletter and handle various other projects.*

Overall, I feel very fortunate to be able to combine my diverse interests in aviation. As a publisher, I am able to draw from my flying and mechanical experience as well as my accident investigation knowledge and business experience. I thoroughly enjoy meeting women in various aviation fields, and I look forward to continued growth in the future.

Mary G. Kelly is the manager of an airport in Oklahoma.

As a mother and teacher, at the age of 34, I took a family vacation to Washington, DC. That trip marked a turning point in my career and life.

A full day in the National Air and Space Museum caught hold of me like nothing I'd ever experienced. I was, for the first time in my life, completely entranced by the spirit of flight. That summer thirteen years ago, I returned to my home in Louisville, Kentucky, looked up a flight school in the yellow pages, and made an appointment for my first flying lesson.

From that first lesson, the world as I had known it began to change. I discovered not only a new perspective from which to view the world, but a learning process that would excite, challenge, and stretch my abilities. Within three years, I made the leap from classroom teacher to flight instructor.

My family was a little bewildered by this new endeavor on my part. I was the first pilot in the family, although I'm hoping to encourage some of my nieces and nephews to learn to fly.

My family would attest to the fact that I've always had a strong will and have been goal-oriented. My tenacity, however, seemed to increase as I pursued additional aviation ratings and certificates. When I passed the certified flight instructor check ride, I made another leap: I decided to leave Kentucky, which had been my home for more than fifteen years. Recently divorced, I was ready for a new beginning.

My brother, a farmer in southwest Oklahoma, invited me to be a farm hand while I was deciding what to do next. I was put to work (I called it hard labor) getting the cotton crop to the gin. When the work was done, my brother introduced me to the aviation people in the area.

In a relatively short time, I was hired as a copilot for the small commuter airlines flying round-trip daily to Oklahoma City. The owners of the local airline service also owned a Part 141 flight school. They wanted to sell it. I knew the airport was where I wanted to be, so I took another leap of faith and bought the school.

The year that followed brought long hours, few days off, little money, but plenty of self satisfaction. Then the next opportunity arose: the position of airport manager became vacant. I pursued that job energetically and was hired!

With the help of an Amelia Earhart Scholarship from the International 99s, 1 obtained a degree in airport management from Western Oklahoma State College while I was on the job.

New opportunities continued to present themselves. I met a wonderful man, Joe Cunningham, who helped me commemorate Amelia Earhart's 1932 flight across the North Atlantica trip that I had wanted to make since I started flying. Joe and l set a world and national record on that flight in a Cessna 172 RG.

I followed Amelia's tracks in the United States, landing at Hatbox Field in Muskogee, Oklahoma, where she had visited friends. I managed Oklahoma's oldest and most historic airport for a period of time.

A little more than a year after our transatlantic trip, Joe and I were married and set another world and national record, commemorating the 53rd anniversary of the Wiley Post-Will Rogers flight to Barrow, Alaska. The record course, which we flew in our own Cherokee 180, was from Rogers' birthplace to the crash site where he and Post were killed.

Presently, I am managing a resort grass strip on Lake Tenkiller in northeast Oklahoma. Joe and I publish a monthly aviation newsletter that is distributed to all the pilots in the state. He is a state aeronautics commissioner.

From president of the Future Teachers of America when I was in high school to the President of the Oklahoma Airport Operators Association and President of the Associated Pilots of Oklahoma, I have made some big leaps, and I have lived the adventures that life offers in the world of flight.

There were many moments in my aviation journey when l was afraid. I discovered that by pushing through that fear came courage. Among Amelia Earhart's compositions is a poem entitled Courage. *The first line of that poem stays with me as I take each leap before me: "Courage is the price which life exacts for granting peace." The full meaning of that statement was understood when I finally spotted the distant hazy shore of Ireland after hours and hours of flying over the ocean. It is a joy to emulate a personal hero and, in the process, find that those qualities you admired are your own.*

Kathryn D. Sullivan, Ph.D., is a NASA astronaut, Lt. Commander in the US Naval Reserve, and adjunct professor of geology at Rice University, Houston, Texas.

I come from a flying family. My father was a bomber pilot in World War II, and a couple of his brothers were pilots. He left the service under an arrangement that gave him a private pilot certificate. Ever since we were very little, my brother and I have had a keen interest in planes. We grew up with a lot of talk about airplanes around the house, since my father, a pilot and an engineer, worked on a variety of aerospace projects. When we were about 10, he activated his private pilot certificate so he could get to good fishing spots faster.

My brother and I were thrilled to be able to go up in airplanes, and we rapidly learned a lot about flying because my father would explain everything to us. We became accustomed to handling the controls and to paying attention to the kinds of things that a pilot must do when conducting a flight.

The family plan was that each of us would get our pilot's license during the summer we finished high school. It didn't work out for me until years later, because I was involved with many activities and often lived in places that had awful weather or airports that were far away. It seemed to me that I needed a certain amount of time and money to devote to that effort in a consistent fashion, or I would just end up dabbling at it. Dabbling is not a very safe thing to do in flying. You have to make sure you've got the time and resources to practice and to keep your skills up to date. It's not something at which you want to become rusty.

My academic interests didn't follow an aviation slant at all. By the second grade, I was interested in scientific experiments. Around fifth or sixth grade, I began to find that I had an interest in, and talent for, foreign languages. I also wanted to explore the world and learn about other countries.

In eighth grade, we had a guidance unit in which I found out for the first time that if you were smart and went to college, you could study abroad for one year. I decided that I was going to attend Stanford University and go to Europe to study in my third year of college. I looked at my grades and told myself to get going. My grades went from A's and B's to all A's and stayed there through high school. It was simply a matter of desire; I knew what I wanted and I knew I had to work for it.

Primarily because of finances, I ended up attending the University of California at Santa Cruz in my home state. Fortunately for me, the University of California required science and humanities majors to take a few courses on the other side of the fence just so students didn't get too narrow-minded.

I took courses in marine biology, oceanography, and geology. Geology was my major. I went abroad as a junior, studied for a year in Norway, and ended up a graduate student at Dalhousie University in Nova Scotia.

In my final year of graduate school, when I was down in the States visiting my parents at Christmas, my brother came up to me and said, "Hey, NASA is hiring new astronauts and they want scientists. You've got a PH .D., you're in geology, you're a woman, and they want women. You should try it."

I found out that the role of mission specialist astronaut is essentially the chief scientist for a space research vessel. I had discovered through my years in marine research that this was the kind of thing I thrived on. To have the opportunity to exercise all those same qualities and make similar discoveries from a research vessel in space just couldn't be passed up. So along with about 6,500 other people, I applied in January 1977 for the job of mission specialist astronaut. Following an extensive evaluation and examination period, 120 potential candidates were interviewed for the job. Then, in January 1978, came the incredible phone call: "About that jobare you still interested ?" Needless to say, I accepted.

My interest in exploration and my interdisciplinary background are probably two of the major reasons why I was selected for NASA's astronaut program. Looking at your papers and transcripts, the selection committee can tell if you are basically an intelligent person with the right education or professional background. The next question is whether your inclinations and temperament are suited to the kinds of activities you' re asked to do as an astronaut.

The astronaut's job is highly interdisciplinary. We're really the people who sit at the ends of many different funnels that various engineers in the thousands are working on. We must make sure that everything fits together properly and works together properly. The human factors engineering, integration and development of procedures, and writing of the checklists are the kinds of things that astronauts get involved in while preparing for flights on the space shuttle. Those things demand that you keep a very broad view.

The person you owe something to is yourself. The person who's going to benefit or be harmed by your doing a good or bad job is you. That's true in every class you take or every job that you do, whether it seems small or big.

It's that commitment to make the most of your talents that gives you the most return. It's like putting money in a bank account that then allows you to buy back vast amounts of knowledge, entertainment, joy, pleasure and excitement, by being able to go off in the world and make use of these things in your day-to-day life.

Challenge yourself! Do things that stretch your abilities. You will get a lot back.

Dr. Peggy Baty is Exeuctive Director of the International Women's Air & Space Museum in Dayton, Ohio.

I grew up in Southern California, but decided to attend a small college in Tennessee to major in education. It wasn't until my senior year in college that I took my first airplane ridein a 1946 Ercoupe, a two-seat, low-wing airplane with a canopy top. It was love at first flight. That winter, I began taking flying lessons in the Ercoupe at the Collegedale Airport outside of Chattanooga, Tennessee.

When I told my family of my intention to enter the world of aviation, my mother sent me a clipping from the Chicago Tribune *describing the benefits available to flight attendants. I wrote back that I had no intention of being in the back of the airplane when I could be the captain.*

With approximately twelve hours of flying under my belt, I began to take aerobatic instruction from Bill Kershner, the well-known aviation author and aerobatic instructor, in Sewanee, Tennessee. Learning to do spins, rolls, loops, Cuban 8s, snap rolls on top of loops, hammerheads, and other aerobatic maneuvers was truly a high point.

It was Bill Kershner who first told me about the opportunities for earning a college degree in aviation and of the aviation department at Middle Tennessee State University. So that fall I enrolled in the Aviation Administration program at MTSU, teaching ground school classes both in Tennessee and Alabama. One such class met in a little airport in Stevenson, Alabama.

In eighth grade, we had a guidance unit in which I found out for the first time that if you were smart and went to college, you could study abroad for one year. I decided that I was going to attend Stanford University and go to Europe to study in my third year of college. I looked at my grades and told myself to get going. My grades went from A's and B's to all A's and stayed there through high school. It was simply a matter of desire; I knew what I wanted and I knew I had to work for it.

Primarily because of finances, I ended up attending the University of California at Santa Cruz in my home state. Fortunately for me, the University of California required science and humanities majors to take a few courses on the other side of the fence just so students didn't get too narrow-minded.

I took courses in marine biology, oceanography, and geology. Geology was my major. I went abroad as a junior, studied for a year in Norway, and ended up a graduate student at Dalhousie University in Nova Scotia.

In my final year of graduate school, when I was down in the States visiting my parents at Christmas, my brother came up to me and said, "Hey, NASA is hiring new astronauts and they want scientists. You've got a PH .D., you're in geology, you're a woman, and they want women. You should try it."

I found out that the role of mission specialist astronaut is essentially the chief scientist for a space research vessel. I had discovered through my years in marine research that this was the kind of thing I thrived on. To have the opportunity to exercise all those same qualities and make similar discoveries from a research vessel in space just couldn't be passed up. So along with about 6,500 other people, l applied in January 1977 for the job of mission specialist astronaut. Following an extensive evaluation and examination period, 120 potential candidates were interviewed for the job. Then, in January 1978, came the incredible phone call: "About that jobare you still interested ?" Needless to say, I accepted.

My interest in exploration and my interdisciplinary background are probably two of the major reasons why I was selected for NASA's astronaut program. Looking at your papers and transcripts, the selection committee can tell if you are basically an intelligent person with the right education or professional background. The next question is whether your inclinations and temperament are suited to the kinds of activities you' re asked to do as an astronaut.

The astronaut's job is highly interdisciplinary. We're really the people who sit at the ends of many different funnels that various engineers in the thousands are working on. We must make sure that everything fits together properly and works together properly. The human factors engineering, integration and development of procedures, and writing of the checklists are the kinds of things that astronauts get involved in while preparing for flights on the space shuttle. Those things demand that you keep a very broad view.

The person you owe something to is yourself. The person who's going to benefit or be harmed by your doing a good or bad job is you. That's true in every class you take or every job that you do, whether it seems small or big.

It's that commitment to make the most of your talents that gives you the most return. It's like putting money in a bank account that then allows you to buy back vast amounts of knowledge, entertainment, joy, pleasure and excitement, by being able to go off in the world and make use of these things in your day-to-day life.

Challenge yourself! Do things that stretch your abilities. You will get a lot back.

Dr. Peggy Baty is Exeuctive Director of the International Women's Air & Space Museum in Dayton, Ohio.

I grew up in Southern California, but decided to attend a small college in Tennessee to major in education. It wasn't until my senior year in college that I took my first airplane ridein a 1946 Ercoupe, a two-seat, low-wing airplane with a canopy top. It was love at first flight. That winter, I began taking flying lessons in the Ercoupe at the Collegedale Airport outside of Chattanooga, Tennessee.

When I told my family of my intention to enter the world of aviation, my mother sent me a clipping from the Chicago Tribune *describing the benefits available to flight attendants. I wrote back that I had no intention of being in the back of the airplane when I could be the captain.*

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I was back in the airport manager's office discussing final details for space allocations and supplies as the students were arriving. When I walked out to the classroom and placed my notes on the podium, I overhead one of the students say, "You mean we have a lady teaching us how to fly?" It was then that I realized that the entire class was composed of men.

I graduated from Middle Tennessee State University in May, 1980 with a BA in Aviation Administration. On graduation day the department chair asked me if I had plans to work on a Masters degree and indicated the possibility of a partial scholarship if I did so. That summer I enrolled in the Aerospace Education Masters program at MTSU.

One of the requirements for this particular degree program was a course designed not so much for aviation students as it was for school teachers. I was really impressed with the motivating power of this course on these teachers' lives and their enthusiasm to take aviation back to their own classrooms and use it with their students. This one course probably had the most influence on my life regarding my desire to promote aviation education and to encourage others to support it as well.

I completed the Masters degree in December of 1980 with the determination to combine my two career interests: aviation and education. Over the next several months, I went on to attain instrument, commercial, and flight instructor certificates and ratings in single- and multi-engine airplanes. My husband, Bruce, and l began an aviation consulting business and flight school in Chattanooga.

As a flight instructor, I encountered a number of interesting responses. For example, upon flying into an airport in Georgia with a female flight student, a gentleman in the fixed base operation asked, "Where's the pilot?" And when flying with a male student on a cross-country flight, upon landing and securing the plane, a lineman would inevitably walk up to the student and ask if he needed any fuel, etc. They assumed that he was pilot in command.

I wanted to become more involved with aviation education, particularly at the collegiate level, so l went back to school. This time, I enrolled at the University of Tennessee in their Educational Administration and Supervision doctoral program in the summer of 1982.1 graduated in August 1985.

Later that month, I was hired as Chairman of the Aviation Administration Department at Georgia State University in Atlanta. I proceeded to initiate a flight simulator training program, an air traffic control course, a flight training arrangement with the Georgia Tech flying club, non-credit ground school courses, Flight Instructor Refresher Clinics, and "Aviation Days in Georgia," a program that brought the aviation community in Atlanta together.

One year later, I moved to Daytona Beach, Florida, to accept a position in the Aeronautical Science Department at Embry-Riddle Aeronautical University. I initiated a teacher workshop program and a host of other projects, and was promoted to Associate Dean of Academics. For five years, I was the Dean and Chief Administrator at Parks College of St. Louis University. My new position with the International Women's Air & Space Museum provides me with the opportunity of preserving and promoting women's role in aviation

You are limited only by your dreams and your willingness to see them through.

Dr. Emily R. Morey-Holton is a research scientist at the NASA-Ames Research Center in Moffett Field, California.

I've always been impressed by individuals who focus on a particular career goal early in life and pursue and achieve that goal. Others, like myself, find exciting but unanticipated careers by pure luck. I began my education in Parkersburg, West Virginia. Parkersburg High School was academically outstanding and ahead of its time in the breadth of courses offered. When I graduated from high school, I was quite sure that twelve years of primary and secondary education were sufficient, and I was not anxious to continue my schooling. Fortunately, my parents disagreed and packed me off to West Virginia University where my initial major was "undecided."

I have also been extremely fortunate to have had very supportive family members, friends, mentors, collaborators, and co-workers. In fact, my college advisor, Dr. Peter Popovich, suggested that I consider spending a year at Harvard Medical School as a technician when I finished college and still was not sure what I wanted to do. He also told me that the Pharmacology Department at the new medical school at West Virginia University had some fellowships available for graduate study.

After a year in Boston, I returned to WVU and to the Pharmacology Department. The department instilled a love of teaching and planted the seeds for a research career, but those seeds did not germinate for several years. Upon completion of my degrees, I taught and did research at other medical schools.

In the late sixties, I moved to the Eastern Shore of Maryland. I quickly learned that a person could actually be over-educated for jobs in certain areas of the country and that those areas did not know or care about the National Institutes of Health and grantsa most humbling experience. One day, in sheer desperation, I jumped into the car and drove to a small NASA launch facility on the Eastern Shore of Virginia. I went straight to the Wallops Station personnel office and said, "Please hire me!" and to my amazement, several weeks later they did.

During one of my first meetings with Dr. Bob Krieger, director of the facility, he said, "There's space, now do something significant." A big task for a small lady. I spent the next five years as the only Life Scientist on the base, where I learned to talk to engineers and launch personnel. Their language is, indeed, different. But I was very impressed by their dedication, hard work, and adherence to launch and planning schedules. Working with them in designing unmanned biological satellites, I developed a much greater appreciation for the type of biological data that engineers need, and I began to understand the complexity of satellite design.

When the research focus of the station began to change, I requested a transfer to NASA's primary facility for basic life sciences research at Ames Research Center in California. The management at Wallops agreed to the transfer, gave me a promotion, and sent me to California, where I am now happily employed.

I am very fortunate to have ended up with a job that is exciting, demanding, and very rewarding, and where I can use both my formal science and informal engineering background.

Jeana Yeager was co-pilot on the Voyager, the first aircraft to fly around the world non-stop.

Once upon a time...I didn't actually grow up with aviation, like most people. It wasn't until I was about 26. I've always been fascinated with helicopters, and I had a crazy desire to fly them. I went down to school in Santa Rosa, California, and found a company that had helicopters. They convinced me I should get the fixed-wing rating first. For whatever reason, it's better to have the helicopter rating as an add-on, instead of getting the fixed-wing rating as an add-on. So anyway, I got my rating in fixed wing, but the company was on financial hard times and I didn't quite make it to the rotor wing.

I have experience in all types of draftingillustrations, mechanical, geophysical, geological, some architectural, very little electrical, some civil. I have worked for companies involved in off-shore drilling, where I did a lot of the seismic maps, labeling, and seismic readings. Later, I went to work for a man named Bob Truax on a backyard program to put a person into space. It was called Project Private Enterprise. This turned into a very good experience. He was good to let me just go out into the shop and play, and to answer my silly questions.

Bob tried to keep me in the office with aeronautical drafting, but I kept drifting off into the shop, and ended up doing office work as well, so I became the person who was doing a little bit of everything. If something needed to be done I usually got volunteered. It was a wonderful friendship with him and all the people who were therea very good all-around work experience. I learned a lot of good basics that served me for the Voyager program.

Time and circumstances got me into flying experimental aircraft. I met Dick Rutan in 1980, and we started friendly competition flying and setting records. I hold five world records (in speed and distance), and Dick has six world records. Then we went on to the Voyager, which seemed a nice evolution to the next records.

Once Dick and I had decided to do the Voyager, we more or less rolled up our sleeves, and not knowing a lot about anything, set up a corporation...learning how to operate a corporation, putting together an airplane without plans, making it up as we went, figuring out how to raise funds, how to make things happen. Everything was a learning step.

The Voyager project was a six-year program. Then came the around-the-world flight on December 1986. Dick and I more than doubled the world record when we flew non-stop and non-refueled around the worldthe first time ever that it was done. The farthest anyone had ever traveled was only half way around the world.
It was exciting watching it all come together, exploring your own self and finding out, "Yeah, I can do this; I'm capable." It was a fun discovery period.

All experiences of your life are training and developing for your next level of expertise. I would say that Voyager is a training situation for my next level. I have no idea what the next level is going to be, but I know I'll be capable of whatever I decide to do.

The Voyager was one of those rare opportunities that hardly ever come along in anybody's lifetime. When you have that opportunity, it's hard to say no. I certainly couldn't. There are very few things that are that unique and that different. It was something I had to be a part of."

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