Introduction To Flying

Introduction

The Pilot's Handbook of Aeronautical Knowledge provides basic knowledge for the student pilot learning to fly, as well as pilots seeking advanced pilot certification. For detailed information on a variety of specialized flight topics, see specific Federal Aviation Administration (FAA) handbooks and Advisory Circulars (ACs).

This chapter offers a brief history of flight, introduces the history and role of the FAA in civil aviation, FAA regulations and standards, government references and publications, eligibility for pilot certificates, available routes to flight instruction, the role of the Certificated Flight Instructor (CFI) and Designated Pilot Examiner (DPE) in flight training, and Practical Test Standards (PTS).

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book provides the foundation for beginning
to understand and apply the fundamentals of

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stance the Airplane Flying Handbook is designed as a
ical manual to introduce basic pilot skills and

Aeronautical Information Manual (AIM)

This manual is designed to provide the aviation community
with basic flight information and ATC procedures for use in
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Instrument Flying Handbook

Unit   The Instrument Flying Handbook is designed for use by
con   instrument flight instructors and pilots preparing for
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for   Instrument Procedures Handbook

The Instrument Procedures Handbook is designed as a
technical reference for professional pilots who operate under
instrument flight rules (IFR) in the National Airspace System
and expands on information contained in the Instrument
Flying Handbook, and introduces

Code of Federal Regulations

Aeronautics and Space

Subchapters   Chapter 1. Federal Aviation Adminis

A   Definitions (definitions and abbreviatio
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            Airworthiness standards [parts 25 thro
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History of Flight

From prehistoric times, humans have watched the flight of birds, longed to imitate them, but lacked the power to do so. Logic dictated that if the small muscles of birds can lift them into the air and sustain them, then the larger muscles of humans should be able to duplicate the feat. No one knew about the intricate mesh of muscles, sinew, heart, breathing system, and devices not unlike wing flaps, variable-camber and spoilers of the modern airplane that enabled a bird to fly. Still, thousands of years and countless lives were lost in attempts to fly like birds.

The identity of the first "bird-men" who fitted themselves with wings and leapt off a cliff in an effort to fly are lost in time, but each failure gave those who wished to fly questions that needed answering. Where had the wing flappers gone wrong? Philosophers, scientists, and inventors offered solutions, but no one could add wings to the human body and soar like a bird. During the 1500s, Leonardo da Vinci filled pages of his notebooks with sketches of proposed flying machines, but most of his ideas were flawed because he clung to the idea of birdlike wings. *[Figure 1-1]* By 1655, mathematician, physicist, and inventor Robert Hooke concluded the human body does not possess the strength to power artificial wings. He believed human flight would require some form of artificial propulsion.

Figure 1-1. *Leonardo da Vinci's ornithopter wings.*

The quest for human flight led some practitioners in another direction. In 1783, the first manned hot air balloon, crafted by Joseph and Etienne Montgolfier, flew for 23 minutes. Ten days later, Professor Jacques Charles flew the first gas balloon. A madness for balloon flight captivated the public's imagination and for a time flying enthusiasts turned their expertise to the promise of lighter-than-air flight. But for all its majesty in the air, the balloon was little more than a billowing heap of cloth capable of no more than a one-way, downwind journey.

Balloons solved the problem of lift, but that was only one of the problems of human flight. The ability to control speed and direction eluded balloonists. The solution to that problem lay in a child's toy familiar to the East for 2,000 years, but not introduced to the West until the 13th century. The kite, used by the Chinese manned for aerial observation and to test winds for sailing, and unmanned as a signaling device and as a toy, held many of the answers to lifting a heavier-than-air device into the air.

One of the men who believed the study of kites unlocked the secrets of winged flight was Sir George Cayley. Born in England 10 years before the Mongolfier balloon flight, Cayley spent his 84 years seeking to develop a heavier-than-air vehicle supported by kite-shaped wings. *[Figure 1-2]* The "Father of Aerial Navigation," Cayley discovered the basic principles on which the modern science of aeronautics is founded, built what is recognized as the first successful flying model, and tested the first full-size man-carrying airplane.

For the half-century after Cayley's death, countless scientists, flying enthusiasts, and inventors worked toward building
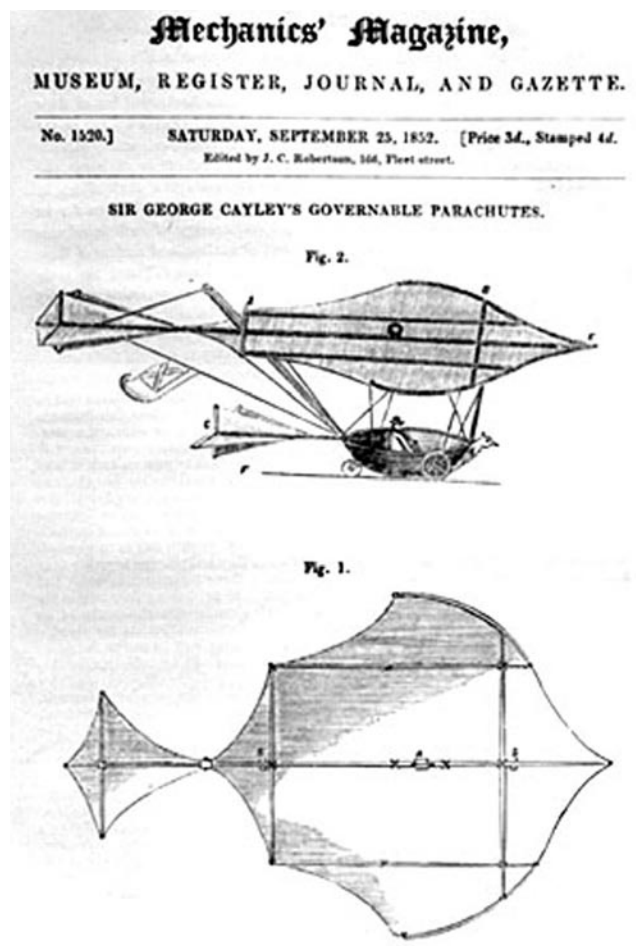

Figure 1-2. *Glider from 1852 by Sir George Cayley, British aviator (1773–1857).*

a powered flying machine. Men, such as William Samuel Henson, who designed a huge monoplane that was propelled by a steam engine housed inside the fuselage, and Otto Lilienthal, who proved human flight in aircraft heavier than air was practical, worked toward the dream of powered flight. A dream turned into reality by Wilbur and Orville Wright at Kitty Hawk, North Carolina, on December 17, 1903.

The bicycle-building Wright brothers of Dayton, Ohio, had experimented for 4 years with kites, their own homemade wind tunnel, and different engines to power their biplane. One of their great achievements was proving the value of the scientific, rather than build-it-and-see approach to flight. Their biplane, The Flyer, combined inspired design and engineering with superior craftsmanship. *[Figure 1-3]* By the afternoon of December 17th, the Wright brothers had flown a total of 98 seconds on four flights. The age of flight had arrived.


Figure 1-3. *First flight by the Wright brothers.*

History of the Federal Aviation Administration (FAA)

During the early years of manned flight, aviation was a free for all because no government body was in place to establish policies or regulate and enforce safety standards. Individuals were free to conduct flights and operate aircraft with no government oversight. Most of the early flights were conducted for sport. Aviation was expensive and became the playground of the wealthy. Since these early airplanes were small, many people doubted their commercial value. One group of individuals believed otherwise and they became the genesis for modern airline travel.

P. E. Fansler, a Florida businessman living in St. Petersburg approached Tom Benoist of the Benoist Aircraft Company in St. Louis, Missouri, about starting a flight route from St. Petersburg across the waterway to Tampa. Benoist suggested using his "Safety First" airboat and the two men signed an agreement for what would become the first scheduled airline in the United States. The first aircraft was delivered to St. Petersburg and made the first test flight on December 31, 1913. *[Figure 1-4]*
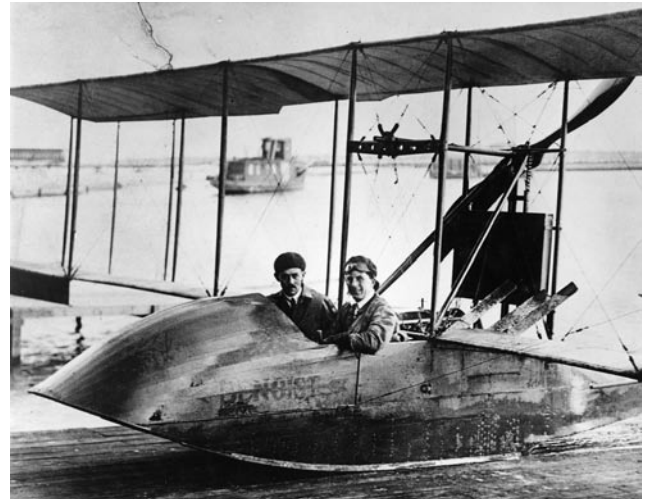
Figure 1-4. *Benoist airboat.*

A public auction decided who would win the honor of becoming the first paying airline customer. The former mayor of St. Petersburg, A. C. Pheil made the winning bid of $400.00 which secured his place in history as the first paying airline passenger.

On January 1, 1914, the first scheduled airline flight was conducted. The flight length was 21 miles and lasted 23 minutes due to a headwind. The return trip took 20 minutes. The line, which was subsidized by Florida businessmen, continued for 4 months and offered regular passage for $5.00 per person or $5.00 per 100 pounds of cargo. Shortly after the opening of the line, Benoist added a new airboat that afforded more protection from spray during takeoff and landing. The routes were also extended to Manatee, Bradenton, and Sarasota giving further credence to the idea of a profitable commercial airline.

The St. Petersburg-Tampa Airboat Line continued throughout the winter months with flights finally being suspended when the winter tourist industry began to dry up. The airline operated only for 4 months, but 1,205 passengers were carried without injury. This experiment proved commercial passenger airline travel was viable.

The advent of World War I offered the airplane a chance to demonstrate its varied capabilities. It began the war as a reconnaissance platform, but by 1918, airplanes were being mass produced to serve as fighters, bombers, trainers, as well as reconnaissance platforms.

Aviation advocates continued to look for ways to use airplanes. Airmail service was a popular idea, but the war prevented the Postal Service from having access to airplanes. The War Department and Postal Service reached an agreement in 1918. The Army would use the mail service to train its pilots in cross-country flying. The first airmail flight was conducted on May 15, 1918, between New York and Washington, DC. The flight was not considered spectacular; the pilot became lost and landed at the wrong airfield. In August of 1918, the United States Postal Service took control of the airmail routes and brought the existing Army airmail pilots and their planes into the program as postal employees.

Transcontinental Air Mail Route

Airmail routes continued to expand until the Transcontinental Mail Route was inaugurated. *[Figure 1-5]* This route spanned from San Francisco to New York for a total distance of 2,612 miles with 13 intermediate stops along the way. *[Figure 1-6]*
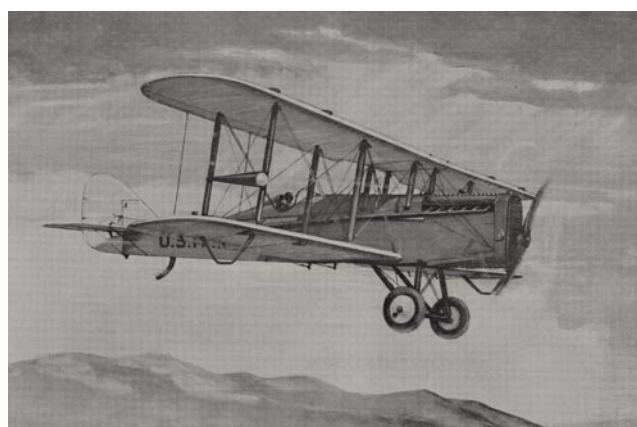
Figure 1-5. *The de Haviland DH-4 on the New York to San Francisco inaugural route in 1921.*

On May 20, 1926, Congress passed the Air Commerce Act, which served as the cornerstone for aviation within the United States. This legislation was supported by leaders in the aviation industry who felt that the airplane could not reach its full potential without assistance from the Federal Government in improving safety.

The Air Commerce Act charged the Secretary of Commerce with fostering air commerce, issuing and enforcing air traffic rules, licensing pilots, certificating aircraft, establishing airways, and operating and maintaining aids to air navigation. The Department of Commerce created a new Aeronautics Branch whose primary mission was to provide oversight for the aviation industry. In addition, the Aeronautics Branch took over the construction and operation of the nation's system of lighted airways. The Postal Service, as part of the

Figure 1-6. *The transcontinental airmail route ran from New York to San Francisco. Intermediate stops were: 2) Bellefonte, 3) Cleveland, 4) Bryan, 5) Chicago, 6) Iowa City, 7) Omaha, 8) North Platte, 9) Cheyenne, 10) Rawlins, 11) Rock Springs, 12) Salt Lake City, 13) Elko, and 14) Reno.*

Transcontinental Air Mail Route system, had initiated this system. The Department of Commerce made great advances in aviation communications, as well as introducing radio beacons as an effective means of navigation.

Built at intervals of approximately 10 miles, the standard beacon tower was 51 feet high, topped with a powerful rotating light. Below the rotating light, two course lights pointed forward and back along the airway. The course lights flashed a code to identify the beacon's number. The tower usually stood in the center of a concrete arrow 70 feet long. A generator shed, where required, stood at the "feather" end of the arrow. *[Figure 1-7]*

Federal Certification of Pilots and Mechanics

The Aeronautics Branch of the Department of Commerce began pilot certification with the first license issued on April 6, 1927. The recipient was the chief of the Aeronautics Branch, William P. MacCracken, Jr. *[Figure 1-8]* (Orville Wright, who was no longer an active flier, had declined the honor.) MacCracken's license was the first issued to a pilot by a civilian agency of the Federal Government. Some 3 months later, the Aeronautics Branch issued the first Federal aircraft mechanic license.

Equally important for safety was the establishment of a system of certification for aircraft. On March 29, 1927, the Aeronautics Branch issued the first airworthiness type certificate to the Buhl Airster CA-3, a three-place open biplane.

In 1934, to recognize the tremendous strides made in aviation and to display the enhanced status within the department,
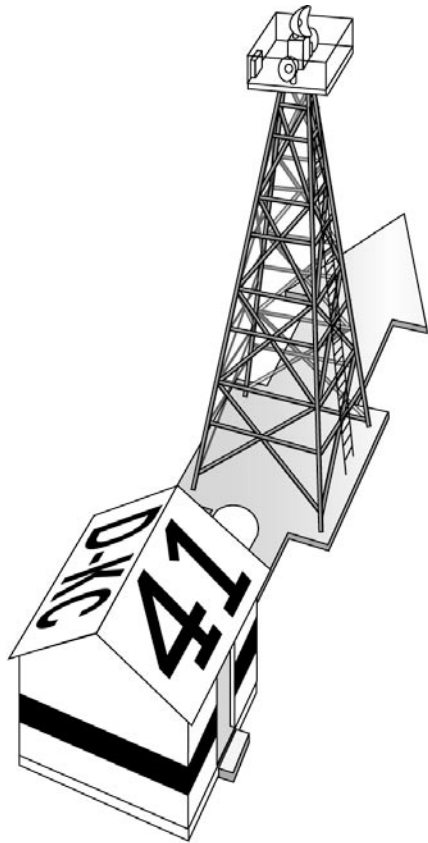
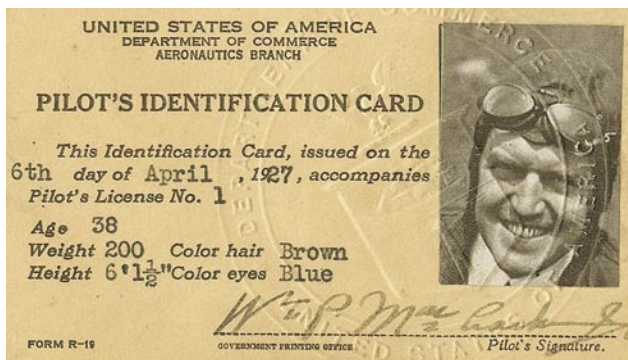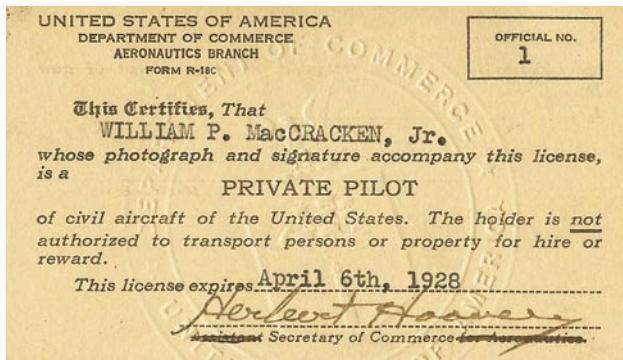**Figure 1-7.** *A standard airway beacon tower.*

Figure 1-8. *The first pilot license was issued to William P. MacCracken, Jr.*

the Aeronautics Branch was renamed the Bureau of Air Commerce. *[Figure 1-9]* Within this time frame, the Bureau of Air Commerce brought together a group of airlines and encouraged them to form the first three Air Traffic Control (ATC) facilities along the established air routes. Then in 1936, the Bureau of Air Commerce took over the responsibilities of operating the centers and continued to advance the ATC facilities. ATC has come a long way from the early controllers using maps, chalkboards, and performing mental math calculations in order to separate aircraft along flight routes.

Figure 1-9. *The third head of the Aeronautics Branch, Eugene L. Vidal, is flanked by President Franklin D. Roosevelt (left) and Secretary of Agriculture Henry A. Wallace (right). The photograph was taken in 1933. During Vidal's tenure, the Aeronautics Branch was renamed the Bureau of Air Commerce on July 1, 1934. The new name more accurately reflected the status of the organization within the Department of Commerce.*

The Civil Aeronautics Act of 1938

In 1938, the Civil Aeronautics Act transferred the civil aviation responsibilities to a newly created, independent body, named the Civil Aeronautics Authority (CAA). This Act empowered the CAA to regulate airfares and establish new routes for the airlines to service.

President Franklin Roosevelt split the CAA into two agencies, the Civil Aeronautics Administration (CAA) and the Civil Aeronautics Board (CAB). Both agencies were still part of the Department of Commerce but the CAB functioned independently of the Secretary of Commerce. The role of the CAA was to facilitate ATC, certification of airmen and aircraft, rule enforcement, and the development of new airways. The CAB was charged with rule making to enhance safety, accident investigation, and the economic regulation of the airlines. Then in 1946, Congress gave the

CAA the responsibility of administering the Federal Aid Airport Program. This program was designed to promote the establishment of civil airports throughout the country.

The Federal Aviation Act of 1958

By mid-century, air traffic had increased and jet aircraft had been introduced into the civil aviation arena. A series of mid-air collisions underlined the need for more regulation of the aviation industry. Aircraft were not only increasing in numbers, but were now streaking across the skies at much higher speeds. The Federal Aviation Act of 1958 established a new independent body that assumed the roles of the CAA and transferred the rule making authority of the CAB to the newly created Federal Aviation Agency (FAA). In addition, the FAA was given complete control of the common civil-military system of air navigation and ATC. The man who was given the honor of being the first administrator of the FAA was former Air Force General Elwood Richard "Pete" Quesada. He served as the administrator from 1959–1961. *[Figure 1-10]*

Figure 1-10. *First Administrator of the FAA was General Elwood Richard "Pete" Quesada, 1959–1961.*

Department of Transportation (DOT)

On October 15, 1966, Congress established the Department of Transportation (DOT), which was given oversight of the transportation industry within the United States. The result was a combination of both air and surface transportation. Its mission was and is to serve the United States by ensuring a fast, safe, efficient, accessible, and convenient transportation system meeting vital national interests and enhancing the quality of life of the American people, then, now, and into the future. At this same time, the Federal Aviation Agency was renamed to the Federal Aviation Administration (FAA). The DOT began operation on April 1, 1967.

The role of the CAB was assumed by the newly created National Transportation Safety Board (NTSB), which was charged with the investigation of all transportation accidents within the United States.

As aviation continued to grow, the FAA took on additional duties and responsibilities. With the highjacking epidemic of the 1960s, the FAA was responsible for increasing the security duties of aviation both on the ground and in the air. After September 11, 2001, the duties were transferred to a newly created body called the Department of Homeland Security (DHS).

With numerous aircraft flying in and out of larger cities, the FAA began to concentrate on the environmental aspect of aviation by establishing and regulating the noise standards of aircraft. Additionally in the 1960s and 1970s, the FAA began to regulate high altitude (over 500 feet) kite and balloon flying. 1970 brought more duties to the FAA by adding the management of a new federal airport aid program and increased responsibility for airport safety.

Air Traffic Control (ATC) Automation

By the mid-1970s, the FAA had achieved a semi-automated ATC system based on a marriage of radar and computer technology. By automating certain routine tasks, the system allowed controllers to concentrate more efficiently on the vital task of providing aircraft separation. Data appearing directly on the controllers' scopes provided the identity, altitude, and groundspeed of aircraft carrying radar beacons. Despite its effectiveness, this system required enhancement to keep pace with the increased air traffic of the late 1970s. The increase was due in part to the competitive environment created by the Airline Deregulation Act of 1978. This law phased out CAB's economic regulation of the airlines, and CAB ceased to exist at the end of 1984.

To meet the challenge of traffic growth, the FAA unveiled the National Airspace System (NAS) Plan in January 1982. The new plan called for more advanced systems for en route and terminal ATC, modernized flight service stations, and improvements in ground-to-air surveillance and communication.

The Professional Air Traffic Controllers Organization (PATCO) Strike

While preparing the NAS Plan, the FAA faced a strike by key members of its workforce. An earlier period of discord between management and the Professional Air Traffic Controllers Organization (PATCO) culminated in a 1970 "sickout" by 3,000 controllers. Although controllers subsequently gained additional wage and retirement benefits, another period of tension led to an illegal strike in August 1981. The government dismissed over 11,000 strike participants and decertified PATCO. By the spring of 1984, the FAA ended the last of the special restrictions imposed to keep the airspace system operating safely during the strike.

The Airline Deregulation Act of 1978

Until 1978, the CAB regulated many areas of commercial aviation such as fares, routes, and schedules. The Airline Deregulation Act of 1978, however, removed many of these controls, thus changing the face of civil aviation in the United States. After deregulation, unfettered free competition ushered in a new era in passenger air travel.

The CAB had three main functions: to award routes to airlines, to limit the entry of air carriers into new markets, and to regulate fares for passengers. Much of the established practices of commercial passenger travel within the United States went back to the policies of Walter Folger Brown, the United States Postmaster General during the administration of President Herbert Hoover. Brown had changed the mail payments system to encourage the manufacture of passenger aircraft instead of mail-carrying aircraft. His influence was crucial in awarding contracts and helped create four major domestic airlines: United, American, Eastern, and Transcontinental and Western Air (TWA). Similarly, Brown had also helped give Pan American a monopoly on international routes.

The push to deregulate, or at least to reform the existing laws governing passenger carriers, was accelerated by President Jimmy Carter, who appointed economist and former professor Alfred Kahn, a vocal supporter of deregulation, to head the CAB. A second force to deregulate emerged from abroad. In 1977, Freddie Laker, a British entrepreneur who owned Laker Airways, created the Skytrain service, which offered extraordinarily cheap fares for transatlantic flights. Laker's offerings coincided with a boom in low-cost domestic flights as the CAB eased some limitations on charter flights, i.e., flights offered by companies that do not actually own planes but leased them from the major airlines. The big air carriers responded by proposing their own lower fares. For example, American Airlines, the country's second largest airline, obtained CAB approval for "SuperSaver" tickets.

All of these events proved to be favorable for large-scale deregulation. In November 1977, Congress formally deregulated air cargo. In late 1978, Congress passed the Airline Deregulation Act of 1978, legislation that had been principally authored by Senators Edward Kennedy and Howard Cannon. *[Figure 1-11]* There was stiff opposition to the bill—from the major airlines who feared free competition, from labor unions who feared nonunion employees, and from safety advocates who feared that safety would be sacrificed. Public support was, however, strong enough to pass the act. The act appeased the major airlines by offering generous subsidies and it pleased workers by offering high unemployment benefits if they lost their jobs as a result. The most important effect of the act, whose laws were slowly phased in, was on the passenger market. For the first time in 40 years, airlines could enter the market or (from 1981) expand their routes as they saw fit. Airlines (from 1982) also had full freedom to set their fares. In 1984, the CAB was finally abolished since its primary duty of regulating the airline industry was no longer necessary.

Figure 1-11. *President Jimmy Carter signs the Airline Deregulation Act in late 1978.*

The Role of the Federal Aviation Administration (FAA)

The Code of Federal Regulations (CFR)

The FAA is empowered by regulations to promote aviation safety and establish safety standards for civil aviation. The FAA achieves these objectives under the Code of Federal Regulations (CFR), which is the codification of the general and permanent rules published by the executive departments and agencies of the United States Government. The regulations are divided into 50 different codes, called Titles, that represent broad areas subject to Federal regulation. FAA regulations are listed under Title 14, Aeronautics and Space, which encompasses all aspects of civil aviation from how to earn a pilot's certificate to maintenance of an aircraft.

Title 14 CFR Chapter 1, Federal Aviation Administration, is broken down into subchapters A through N as illustrated in *Figure 1-12*.

Code of Federal Regulations	
Aeronautics and Space	
Subchapters	Chapter 1. Federal Aviation Administration
A	Definitions (definitions and abbreviations)
B	Procedural rules (rulemaking processes, claims, enforcement)
C	Aircraft (Aircraft certification procedures [21], Airworthiness standards [parts 25 through 33 depending on type of aircraft], airworthiness directives [39], maintenance [43], aircraft registration [47])
D	Airmen (certification of pilots and Instructors [61], (Medical standards [67])
E	Airspace (designation of airspace classification [71], special use airspace [73]
F	Air traffic and general rules (general operating and flight rules [91], special air traffic rules and airport traffic patterns [93])
G	Air carriers, air travel clubs. and operators for compensation or hire: certification and operations
H	Schools and other certified agencies
I	Airports
J	Navigational facilities
K	Administrative regulations
L–M	Reserved
N	War risk insurance

Figure 1-12. *Overview of 14 CFR, available online free from the FAA, and for purchase through commercial sources.*

For the pilot, certain parts of 14 CFR are more relevant than others. During flight training, it is helpful for the pilot to become familiar with the parts and subparts that relate to flight training and pilot certification. For instance, 14 CFR part 61 pertains to the certification of pilots, flight instructors, and ground instructors. It also defines the eligibility, aeronautical knowledge, flight proficiency, as well as training and testing requirements for each type of pilot certificate issued. 14 CFR part 91 provides guidance in the areas of general flight rules, visual flight rules (VFR), and instrument flight rules (IFR), while 14 CFR part 43 covers aircraft maintenance, preventive maintenance, rebuilding, and alterations.

Primary Locations of the FAA

The FAA headquarters are in Washington, D.C., and there are nine regional offices strategically located across the United States. The agency's two largest field facilities are the Mike Monroney Aeronautical Center (MMAC) in Oklahoma City, Oklahoma, and the William J. Hughes Technical Center (WJHTC) in Atlantic City, New Jersey. Home to FAA training and logistics services, the MMAC provides

a number of aviation safety-related and business support services. The WJHTC is the premier aviation research and development and test and evaluation facility in the country. The center's programs include testing and evaluation in ATC, communication, navigation, airports, aircraft safety, and security. Furthermore, the WJHTC is active in long-range development of innovative aviation systems and concepts, development of new ATC equipment and software, and modification of existing systems and procedures.

Field Offices

Flight Standards Service

Within the FAA, the Flight Standards Service promotes safe air transportation by setting the standards for certification and oversight of airmen, air operators, air agencies, and designees. It also promotes safety of flight of civil aircraft and air commerce by:

- Accomplishing certification, inspection, surveillance, investigation, and enforcement.

- Setting regulations and standards.

- Managing the system for registration of civil aircraft and all airmen records.

The focus of interaction between Flight Standards Service and the aviation community/general public is the Flight Standards District Office (FSDO).

Flight Standards District Office (FSDO)

The FAA has approximately 130 FSDOs. *[Figure 1-13]* These offices provide information and services for the aviation community. FSDO phone numbers are listed in the telephone directory under Government Offices, DOT, FAA. Another convenient method of finding a local office is to use the FSDO locator available at: www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs600.

Figure 1-13. *Atlanta Flight Standards District Office (FSDO).*

In addition to accident investigation and the enforcement of aviation regulations, the FSDO is also responsible for the certification and surveillance of air carriers, air operators, flight schools/training centers, and airmen including pilots and flight instructors. Each FSDO is staffed by Aviation Safety Inspectors (ASIs) who play a key role in making the nation's aviation system safe.

Aviation Safety Inspector (ASI)

The Aviation Safety Inspectors (ASIs) administer and enforce safety regulations and standards for the production, operation, maintenance, and/or modification of aircraft used in civil aviation. They also specialize in conducting inspections of various aspects of the aviation system, such as aircraft and parts manufacturing, aircraft operation, aircraft airworthiness, and cabin safety. ASIs must complete a training program at the FAA Academy in Oklahoma City, Oklahoma, which includes airman evaluation, and pilot testing techniques and procedures. ASIs also receive extensive on-the-job training and recurrent training on a regular basis. The FAA has approximately 3,700 inspectors located in its FSDO offices. All questions concerning pilot certification (and/or requests for other aviation information or services) should be directed to the local FSDO.

FAA Safety Team (FAASTeam)

The FAA is dedicated to improving the safety of United States civilian aviation by conveying safety principles and practices through training, outreach, and education. The FAA Safety Team (FAASTeam) exemplifies this commitment. The FAASTeam has replaced the Aviation Safety Program (ASP), whose education of airmen on all types of safety subjects successfully reduced accidents. Its success led to its demise because the easy-to-fix accident causes have been addressed. To take aviation safety one step further, Flight Standards Service created the FAASTeam, which is devoted to reducing aircraft accidents by using a coordinated effort to focus resources on elusive accident causes.

Each of the FAA's nine regions has a Regional FAASTeam Office dedicated to this new safety program and managed by the Regional FAASTeam Manager (RFM). The FAASTeam is "teaming" up with individuals and the aviation industry to create a unified effort against accidents and "tip" the safety culture in the right direction. To learn more about this effort to improve aviation safety, to take a course at their online learning center, or to join the FAASTeam, visit their web site at www.faasafety.gov/default.aspx.

Obtaining Assistance from the FAA

Information can be obtained from the FAA by phone, Internet/e-mail, or mail. To talk to the FAA toll-free 24 hours a day, call 1-866-TELL-FAA (1-866-835-5322). To visit the FAA's web site, go to www.faa.gov. Individuals can also e-mail an FAA representative at a local FSDO office by accessing the staff e-mail address available via the "Contact FAA" link at the bottom of the FAA home page. Letters can be sent to:

> Federal Aviation Administration
> 800 Independence Ave, SW
> Washington, DC 20591

FAA Reference Material

The FAA provides a variety of important reference material for the student, as well as the advanced civil aviation pilot. In addition to the regulations provided online by the FAA, several other publications are available to the user. Almost all reference material is available online at www.faa.gov in downloadable format. Commercial aviation publishers also provide published and online reference material to further aid the aviation pilot.

Aeronautical Information Manual (AIM)

The Aeronautical Information Manual (AIM) is the official guide to basic flight information and ATC procedures for the aviation community flying in the NAS of the United States. *[Figure 1-14]* An international version, containing parallel information, as well as specific information on international airports, is also available. The AIM also contains information of interest to pilots, such as health and medical facts, flight safety, a pilot/controller glossary of terms used in the system, and information on safety, accidents, and reporting of hazards.
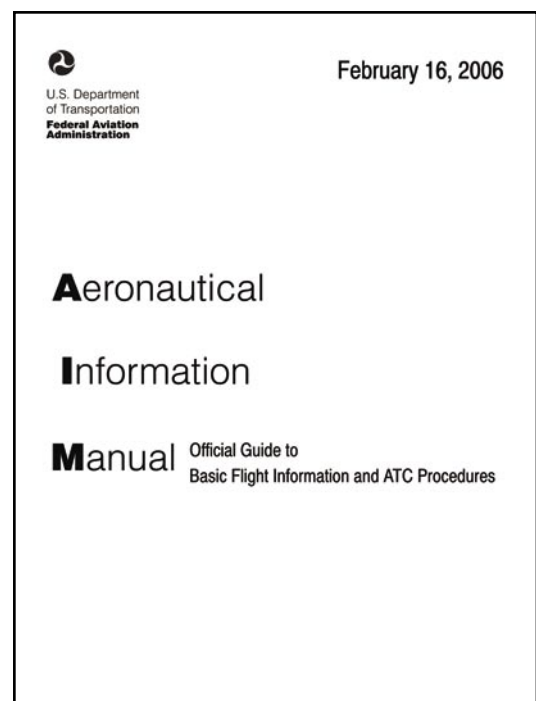
Figure 1-14. *Aeronautical Information Manual.*

This manual is offered for sale on a subscription basis or is available online at: http://bookstore.gpo.gov.

Order forms are provided at the beginning of the manual or online and should be sent to the Superintendent of Documents, United States Government Printing Office (GPO). The AIM is complemented by other operational publications, which are available via separate subscriptions or online.

Handbooks

Handbooks are developed to provide specific information about a particular topic that enhances training or understanding. The FAA publishes a variety of handbooks that generally fall into three categories: Aircraft, Aviation, and Examiners and Inspectors. *[Figure 1-15]* These handbooks can be purchased from the Superintendent of Documents or downloaded (www.faa.gov/regulations_policies). Aviation handbooks are also published by various commercial aviation companies. Aircraft flight manuals commonly called Pilot Operating Handbooks (POH) are documents developed by the airplane manufacturer, approved by the FAA, and are specific to a particular make and model aircraft by serial number. This subject is covered in greater detail in Chapter 8, Flight Manuals and Other Documents, of this handbook. *[Figure 1-16]*

Advisory Circulars (ACs)

Advisory circulars (ACs) provide a single, uniform, agency-wide system that the FAA uses to deliver advisory material to FAA customers, industry, the aviation community, and the public. An AC may be needed to:

- Provide an acceptable, clearly understood method for complying with a regulation.

- Standardize implementation of the regulation or harmonize implementation for the international aviation community.

- Resolve a general misunderstanding of a regulation.

- Respond to a request from some government entity, such as General Accounting Office, NTSB, or the Office of the Inspector General.

- Help the industry and FAA effectively implement a regulation.

- Explain requirements and limits of an FAA grant program.

- Expand on standards needed to promote aviation safety, including the safe operation of airports.

There are three parts to an AC number, as in 25-42C. The first part of the number identifies the subject matter area of the AC and corresponds to the appropriate 14 CFR part. For example, an AC on certification: Pilots and Flight and

Aeronautical Information Manual (AIM)

The Aeronautical Information Manual is designed to provide the aviation community with basic flight information and ATC procedures for use in the NAS of the United States. It also contains the fundamentals required in order to fly in the United States NAS, including items of interest to pilots concerning health/medical facts, factors affecting flight safety, etc.

Airplane Flying Handbook

The Airplane Flying Handbook is designed as a technical manual to introduce basic pilot skills and knowledge that are essential for piloting airplanes. It provides information on transition to other airplanes and the operation of various airplane systems.

Aviation Instructor's Handbook

The Aviation Instructor's Handbook provides the foundation for beginning instructors to understand and apply the fundamentals of instructing. This handbook also provides aviation instructors with up-to-date information on learning and teaching, and how to relate this information to the task of conveying aeronautical knowledge and skills to students. Experienced aviation instructors also find the new and updated information useful for improving their effectiveness in training activities.

Instrument Flying Handbook

The Instrument Flying Handbook is designed for use by instrument flight instructors and pilots preparing for instrument rating tests. Instructors find this handbook a valuable training aid as it includes basic reference material for knowledge testing and instrument flight training.

Instrument Procedures Handbook

The Instrument Procedures Handbook is designed as a technical reference for professional pilots who operate under IFR in the NAS and expands on information contained in the Instrument Flying Handbook.

Figure 1-15. *A few samples of the handbooks available to the public. Most are free of charge or can be downloaded from the FAA website.*
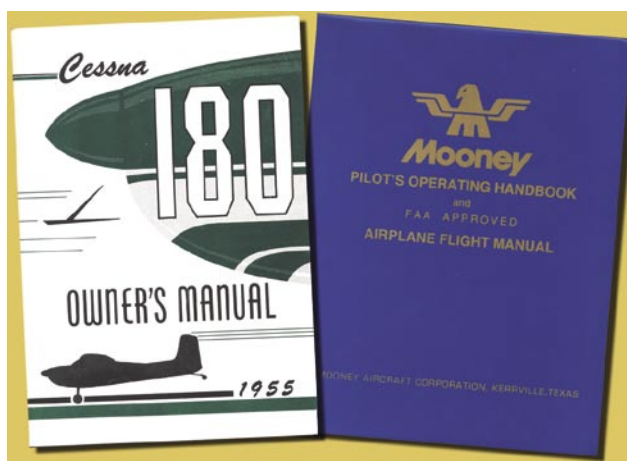

Figure 1-16. *Pilot Operating Handbooks from manufacturers.*

Ground Instructors is numbered as AC 61-65E. Since ACs are numbered sequentially within each subject area, the second part of the number beginning with the dash identifies this sequence. The third part of the number is a letter assigned by the originating office and shows the revision sequence if an AC is revised. The first version of an AC does not have a revision letter. In *Figure 1-17*, this is the fifth revision, as designated by the "E."
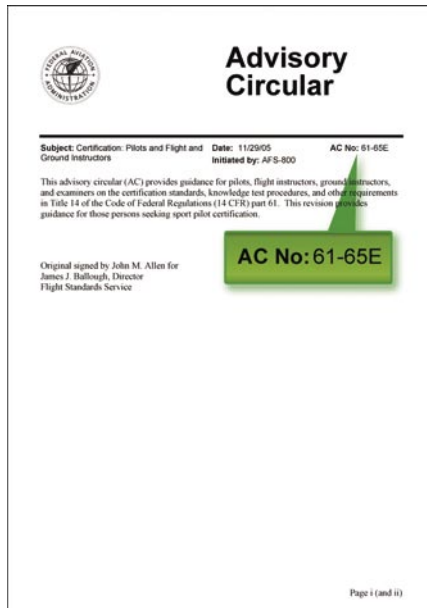

Figure 1-17. *Example of an Advisory Circular.*

Flight Publications

The FAA, in concert with other government agencies, orchestrates the publication and changes to publications that are key to safe flight. *Figure 1-18* illustrates some publications a pilot uses.

Pilot and Aeronautical Information
Notices to Airmen (NOTAMs)

Time-critical aeronautical information, which is of either a temporary nature or not sufficiently known in advance to permit publication on aeronautical charts or in other operational publications, receives immediate dissemination via the National Notice to Airmen (NOTAM) System. NOTAMs contain current notices to airmen, which are considered essential to the safety of flight, as well as supplemental data affecting other operational publications. NOTAM information is classified into two categories: NOTAM (D) or distant and Flight Data Center (FDC) NOTAMs.

NOTAM (D) information is disseminated for all navigational facilities that are part of the NAS, all public use airports, seaplane bases, and heliports listed in the Airport/Facility Directory (A/FD). NOTAM (D) information now includes such data as taxiway closures, personnel and equipment near or crossing runways, and airport lighting aids that do not affect instrument approach criteria, such as visual approach slope indicator (VASI).
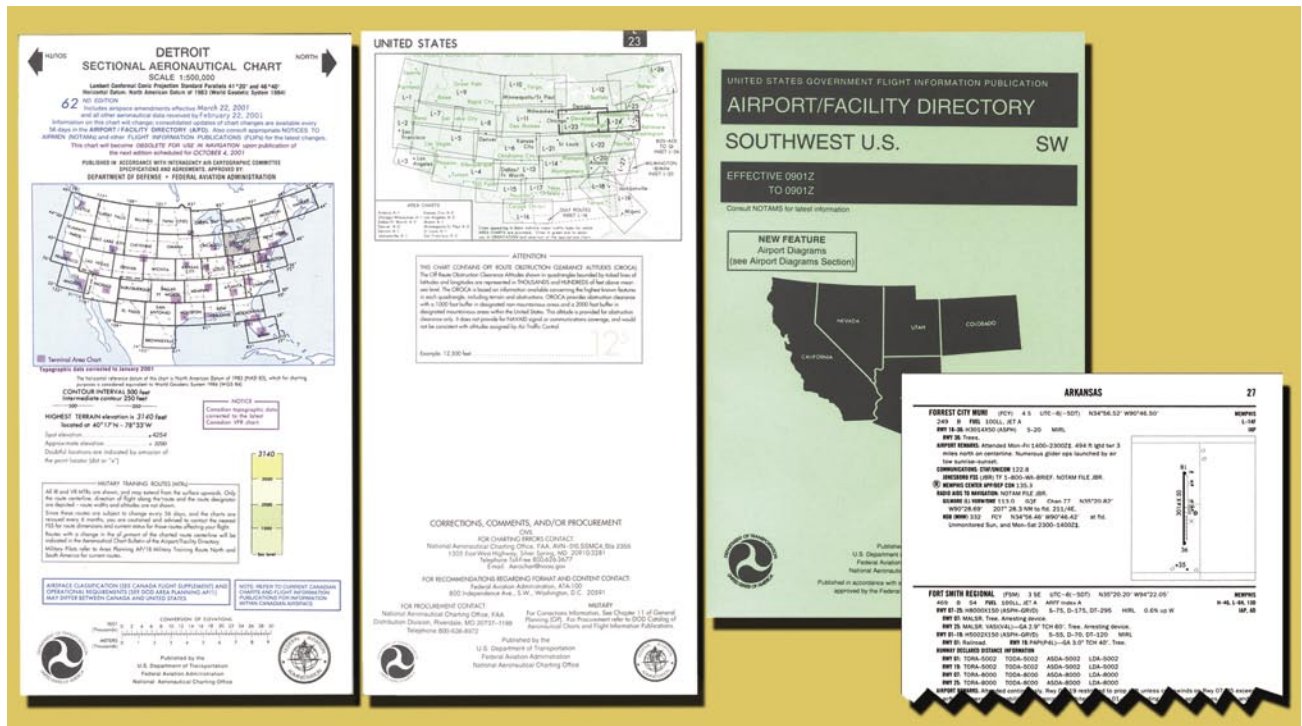

Figure 1-18. *From left to right, a sectional VFR chart, IFR chart, and A/FD with a sample of a page from that directory.*

FDC NOTAMs contain such things as amendments to published Instrument Approach Procedures (IAPs) and other current aeronautical charts. They are also used to advertise temporary flight restrictions caused by such things as natural disasters or large-scale public events that may generate a congestion of air traffic over a site.

NOTAMs are available in printed form through subscription from the Superintendent of Documents, from an FSS, or online at The Pilot Web Site (http://pilotweb.nas.faa.gov/distribution/atcscc.html), which provides access to current NOTAM information. *[Figure 1-19]*
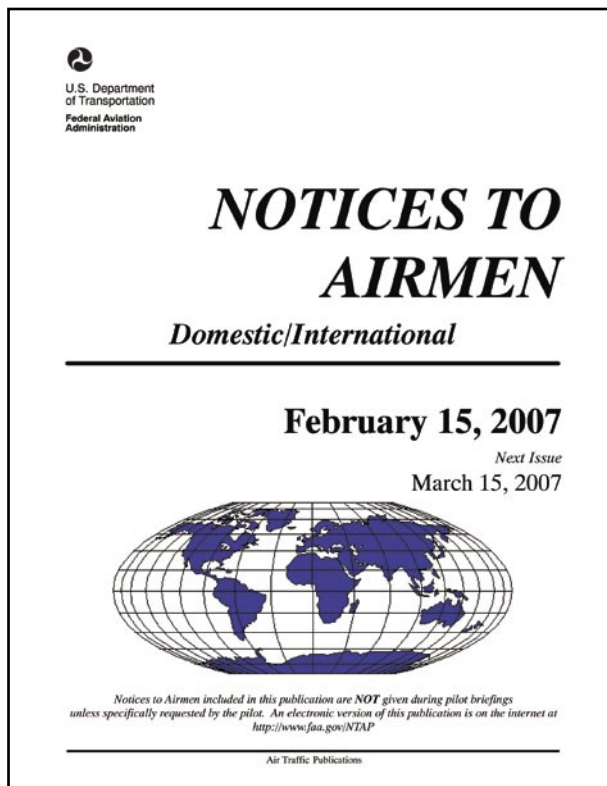
Figure 1-19. *A sample of NOTAM information available to the public. Most are free of charge or can be downloaded from the FAA website.*

Safety Program Airmen Notification System (SPANS)

The FAA recently launched the Safety Program Airmen Notification System (SPANS), an online event notification system that provides timely and easy-to-assess seminar and event information notification for airmen. The SPANS system is taking the place of the current paper based mail system. This transition will provide better service to airmen while reducing costs for the FAA. Anyone can search the SPANS system and register for events. To read more about SPANS, visit www.faasafety.gov/SPANS/default.aspx.

Aircraft Types and Categories

Ultralight Vehicles

An ultralight aircraft *[Figure 1-20]* is referred to as a vehicle because the FAA does not govern it if it:

- Is used or intended to be used by a single occupant.
- Is used for recreation or sport purposes.
- Does not have an airworthiness certificate.
- If unpowered, weighs less than 155 pounds.
- If powered, weighs less than 254 pounds empty weight, excluding floats and safety devices that are intended for deployment in a potentially catastrophic situation.
- Has a fuel capacity not exceeding 5 gallons.
- Is not capable of more than 55 knots calibrated airspeed at full power in level flight.
- Has a power-off stall speed, which does not exceed 24 knots calibrated airspeed.

Figure 1-20. *A typical ultralight vehicle, which weighs less than 254 pounds.*

Ultralight vehicles do not require any form of pilot license or certification if they are flown within 14 CFR 103 operating rules which generally limit the ultralight vehicle to uncontrolled airpsace and no flight over populated areas. Every person flying an ultralight should be familiar to the rules specified in 14 CFR 103.

Light Sport Aircraft (LSA) Category

In 2004, the FAA approved a new pilot certificate and aircraft category program to allow individuals to join the aviation community by reducing training requirements that affect the overall cost of learning to fly. The Sport Pilot Certificate was created for pilots flying light-weight, simple aircraft and offers limited privileges. The category of aircraft called the

Light Sport Aircraft (LSA) includes Airplane (Land/Sea), Gyroplane, Airship, Balloon, Weight-Shift Control (Land/Sea), Glider, and Powered Parachute. *[Figure 1-21]*

In order for an aircraft to fall in the Light Sport Category, it must meet the following criteria:

- The maximum gross takeoff weight may not exceed 1,320 pounds, or 1,430 pounds for seaplanes. Lighter-than-air maximum gross weight may not be more than 660 pounds.

Figure 1-21. *Some examples of LSA (from top to bottom: gyroplane, weight-shift control, and a powered parachute).*

- The maximum stall speed may not exceed 45 knots, and the inflight maximum speed in level flight with maximum continuous power is no greater than 120 knots.

- Seating is restricted to single or two-seat configuration only.

- The powerplant may be only a single, reciprocating engine (if powered), but may include rotary or diesel engines.

- The landing gear must be fixed, except gliders or those aircraft intended for operation on water.

- The aircraft can be manufactured and sold ready-to-fly under a new special LSA category, and certification must meet industry consensus standards. The aircraft may be used for sport, recreation, flight training, and aircraft rental.

- The aircraft will have an FAA registration N-number and may be operated at night if the aircraft is properly equipped and the pilot holds at least a private pilot certificate with a minimum of a third-class medical.

Pilot Certifications

The type of intended flying will influence what type of pilot's certificate is required. Eligibility, training, experience, and testing requirements differ depending on the type of certificates sought. *[Figure 1-22]*

Figure 1-22. *Front side (top) and back side (bottom) of an airman certificate issued by the FAA.*

Sport Pilot

To become a sport pilot, the student pilot is required to have the following hours depending upon the aircraft:

- Airplane: 20 hours
- Powered Parachute: 12 hours
- Weight-Shift Control (Trikes): 20 hours
- Glider: 10 hours
- Rotorcraft (gyroplane only): 20 hours
- Lighter-Than-Air: 20 hours (airship) or 7 hours (balloon)

To earn a Sport Pilot Certificate, one must:

- Be at least 16 to become a student sport pilot (14 for glider).
- Be at least 17 to test for a sport pilot certificate (16 for gliders).
- Be able to read, write, and understand English.
- Hold a current and valid driver's license as evidence of medical eligibility.

Recreational Pilot

To become a recreational pilot, one must:

- Be at least 17 years old (16 to be a private glider pilot or be rated for free flight in a balloon.)
- Be able to read, write, speak and understand the English language
- Pass the required knowledge test
- Meet the aeronautical experience requirements
- A logbook endorsement from an instructor
- Pass the required practical test
- Third-class medical certificate issued under part 14 CFR part 67, except for gliders and balloons—medical eligibility not required

As a recreational pilot, cross-country flight is limited to a 50 NM range from departure airport but is permitted with additional training per 14 CFR section 61.101(c). Additional limitations include flight during the day, and no flying in airspace where communications with air traffic control are required.

The aeronautical experience requirements for a recreational pilot license

- 30 hours of flight time including at least:
- 15 hours of dual instruction
- 2 hours of enroute training

- 3 hours in preparation for the practical test
- 3 hours of solo flight

Private Pilot

A private pilot is one who flies for pleasure or personal business without accepting compensation for flying except in some very limited, specific circumstances. The Private Pilot Certificate is the certificate held by the majority of active pilots. It allows command of any aircraft (subject to appropriate ratings) for any noncommercial purpose, and gives almost unlimited authority to fly under VFR. Passengers may be carried, and flight in furtherance of a business is permitted; however, a private pilot may not be compensated in any way for services as a pilot, although passengers can pay a pro rata share of flight expenses, such as fuel or rental costs. If training under 14 CFR part 61, experience requirements include at least 40 hours of piloting time, including 20 hours of flight with an instructor and 10 hours of solo flight. *[Figure 1-23]*

Figure 1-23. *A typical aircraft a private pilot might fly.*

Commercial Pilot

A commercial pilot may be compensated for flying. Training for the certificate focuses on a better understanding of aircraft systems and a higher standard of airmanship. The Commercial Certificate itself does not allow a pilot to fly in instrument meteorological conditions (IMC), and commercial pilots without an instrument rating are restricted to daytime flight within 50 nautical miles (NM) when flying for hire.

A commercial airplane pilot must be able to operate a complex airplane, as a specific number of hours of complex (or turbine-powered) aircraft time are among the prerequisites, and at least a portion of the practical examination is performed in a complex aircraft. A complex aircraft must have retractable landing gear, movable flaps, and a controllable pitch propeller. See 14 CFR part 61, section 61.31(c) for additional information. *[Figure 1-24]*

Figure 1-24. *A complex aircraft.*

Airline Transport Pilot

The airline transport pilot (ATP) is tested to the highest level of piloting ability. The ATP Certificate is a prerequisite for acting as a pilot in command (PIC) of scheduled airline operations. The minimum pilot experience is 1,500 hours of flight time. In addition, the pilot must be at least 23 years of age, be able to read, write, speak, and understand the English language, and be "of good moral standing." *[Figure 1-25]*

Figure 1-25. *Type of aircraft flown by an airline transport pilot.*

Selecting a Flight School

Selection of a flight school is an important consideration in the flight training process. FAA-approved flight schools, noncertificated flying schools, and independent flight instructors conduct flight training in the United States. All flight training is conducted under the auspices of the FAA following the regulations outlined in either 14 CFR part 141 or 61. 14 CFR part 141 flight schools are certificated by the FAA. Application for certification is voluntary and the school must meet stringent requirements for personnel, equipment, maintenance, facilities, and teach an established curriculum, which includes a training course outline (TCO) approved by the FAA. The certificated schools may qualify for a ground school rating and a flight school rating. In addition, the school may be authorized to give its graduates practical (flight) tests and knowledge (computer administered written) tests. AC 140-2, as amended, FAA Certificated Pilot Schools Directory,

lists certificated ground and flight schools and the pilot training courses each school offers. AC 140-2, as amended, can be found online at the FAA's Regulations and Guidance Library located on the FAA's web site at www.faa.gov.

Enrollment in a 14 CFR part 141 flight school ensures quality and continuity, and offers a structured approach to flight training because these facilities must document the training curriculum and have their flight courses approved by the FAA. These strictures allow 14 CFR part 141 schools to complete certificates and ratings in fewer flight hours, which can mean a savings on the cost of flight training for the student pilot. For example, the minimum requirement for a Private Pilot Certificate is 35 hours in a part 141-certificated school and 40 hours in part 61 schools. (This difference may be insignificant for a Private Pilot Certificate because the national average indicates most pilots require 60 to 75 hours of flight training.)

Many excellent flight schools find it impractical to qualify for the FAA part 141 certificates and are referred to as part 61 schools. 14 CFR part 61 outlines certificate and rating requirements for pilot certification through noncertificated schools and individual flight instructors. It also states what knowledge-based training must be covered and how much flight experience is required for each certificate and rating. Flight schools and flight instructors who train must adhere to the statutory requirements and train pilots to the standards found in 14 CFR part 61.

One advantage of flight training under 14 CFR part 61 is its flexibility. Flight lessons can be tailored to the individual student, because 14 CFR part 61 dictates the required minimum flight experience and knowledge-based training necessary to gain a specific pilot's license, but it does not stipulate how the training is to be organized. This flexibility can also be a disadvantage because a flight instructor who fails to organize the flight training can cost a student pilot time and expense through repetitious training. One way for a student pilot to avoid this problem is to insure the flight instructor has a well-documented training syllabus.

How To Find a Reputable Flight Program

To obtain information about pilot training, contact the local FSDO, which maintains a current file on all schools within its district. The choice of a flight school depends on what type of certificate is sought, whether an individual wishes to fly as a sport pilot or wishes to pursue a career as a professional pilot. Another consideration is the amount of time that can be devoted to training. Ground and flight training should be obtained as regularly and frequently as possible because this assures maximum retention of instruction and the achievement of requisite proficiency.

Do not make the determination based on financial concerns alone, because the quality of training is very important. Prior to making a final decision, visit the schools under consideration and talk with management, instructors, and students.

Be inquisitive and proactive when searching for a flight school, do some homework, and develop a checklist of questions by talking to pilots and reading articles in flight magazines. The checklist should include questions about aircraft reliability and maintenance practices, questions for current students such as whether or not there is a safe, clean aircraft available when they are scheduled to fly.

Questions for the training facility should be aimed at determining if the instruction fits available personal time. What are the school's operating hours? Does the facility have dedicated classrooms available for ground training required by the FAA? Is there an area available for preflight briefings, postflight debriefings, and critiques? Are these rooms private in nature in order to provide a nonthreatening environment in which the instructor can explain the content and outcome of the flight without making the student feel self-conscious?

Examine the facility before committing to any flight training. Evaluate the answers on the checklist, and then take time to think things over before making a decision. This proactive approach to choosing a flight school will ensure a student pilot contracts with a flight school or flight instructor best suited to individual needs.

How To Choose a Certificated Flight Instructor (CFI)

Whether an individual chooses to train under 14 CFR part 141 or part 61, the key to an effective flight program is the quality of the ground and flight training received from the CFI. The flight instructor assumes total responsibility for training an individual to meet the standards required for certification within an ever-changing operating environment.

A CFI should possess an understanding of the learning process, knowledge of the fundamentals of teaching, and the ability to communicate effectively with the student pilot. During the certification process, a flight instructor applicant is tested on the practical application of these skills in specific teaching situations. The flight instructor is crucial to the scenario-based training program endorsed by the FAA. He or she is trained to function in the learning environment as an advisor and guide for the learner. The duties, responsibilities, and authority of the CFI include the following:

- Orient the student to the scenario-based training system.

- Help the student become a confident planner and inflight manager of each flight and a critical evaluator of their own performance.

- Help the student understand the knowledge requirements present in real world applications.

- Diagnose learning difficulties and helping the student overcome them.

- Evaluate student progress and maintain appropriate records.

- Provide continuous review of student learning.

Should a student pilot find the selected CFI is not training in a manner conducive for learning, or the student and CFI do not have compatible schedules, the student pilot should find another CFI. Choosing the right CFI is important because the quality of instruction and the knowledge and skills acquired from this flight instructor affect a student pilot's entire flying career.

The Student Pilot

The first step in becoming a pilot is to select a type of aircraft. FAA rules for getting a pilot's certificate differ depending on the type of aircraft flown. Individuals can choose among airplanes, gyroplanes, weight-shift, helicopters, powered parachutes, gliders, balloons, or airships. A pilot does not need a certificate to fly ultralight vehicles.

Basic Requirements

A student pilot is one who is being trained by an instructor pilot for his or her first full certificate, and is permitted to fly alone (solo) under specific, limited circumstances. Upon request, an FAA-authorized aviation medical examiner (AME) will issue a combined medical certificate and Student Pilot Certificate after completion of a physical examination. Student Pilot Certificates may be issued by an FAA inspector or an FAA-designated pilot examiner. To be eligible for a Student Pilot's Certificate, an individual must be:

- Be 16 years old (14 years old to pilot a glider or balloon).

- Be able to read, write, speak, and understand English.

- Hold a current Third-Class Medical Certificate (or for glider or balloon, certify no medical defect exists that would prevent piloting a balloon or glider).

Medical Certification Requirements

The second step in becoming a pilot is to obtain a medical certificate and Student Pilot's Certificate if the choice of aircraft is an airplane, helicopter, gyroplane, or airship. *[Figure 1-26]* (The FAA suggests the individual get a medical certificate before beginning flight training to avoid the expense of flight training that cannot be continued due to a medical condition.) Balloon or glider pilots do not need a medical certificate, but do need to write a statement certifying that no medical defect exists that would prevent them from piloting a balloon or glider. The new sport pilot category does not require a medical examination; a driver's license can be used as proof of medical competence. Applicants who fail to meet certain requirements or who have physical disabilities which might limit, but not prevent, their acting as pilots, should contact the nearest FAA office.

Figure 1-26. *A Third-Class Medical Certificate/Student Pilot Certificate.*

A medical certificate is obtained by passing a physical examination administered by a doctor who is an FAA-authorized AME. There are approximately 6,000 FAA-authorized AMEs in the nation. Medical certificates are designated as first class, second class, or third class. Generally, first class is designed for the airline transport pilot; second class for the commercial pilot; and third class for the student, recreational, and private pilot. A Student Pilot Certificate is issued by an AME at the time of the student's first medical examination. This certificate allows an individual who is being trained by a flight instructor to fly alone (solo) under specific, limited circumstances and must be carried with the student pilot while exercising solo flight privileges. The student pilot certificate is only required when exercising solo flight privileges. The student certificate is valid until the last day of the month, 24 months after it was issued.

Student Pilot Solo Requirements

Once a student has accrued sufficient training and experience, a CFI can endorse the student's certificate to authorize limited solo flight in a specific type (make and model) of aircraft. A student pilot may not carry passengers, fly in furtherance of a business, or operate an aircraft outside of the various endorsements provided by the flight instructor. There is no minimum aeronautical knowledge or experience requirement for the issuance of a student pilot certificate other than the medical requirements for the class of medical certificate the student certificate is based upon. There are, however, minimum aeronautical knowledge and experience requirements for student pilots to solo.

Becoming a Pilot

The course of instruction a student pilot follows depends on the type of certificate sought. It should include the ground and flight training necessary to acquire the knowledge and skills required to safely and efficiently function as a certificated pilot in the selected category and class of aircraft. The specific knowledge and skill areas for each category and class of aircraft are outlined in 14 CFR part 61. Eligibility, aeronautical knowledge, proficiency, and aeronautical requirements can be found in 14 CFR part 61, Certification: Pilots, Flight Instructors, and Ground Instructors.

- Recreational Pilot, see subpart D
- Private Pilot, see subpart E
- Sport Pilot, see subpart J

The knowledge-based portion of training is obtained through FAA handbooks such as this one, textbooks, and other sources of training and testing materials which are available in print form from the Superintendent of Documents, GPO, and online

at the Regulatory Support Division: www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs600.

The CFI may also use commercial publications as a source of study materials, especially for aircraft categories where government materials are limited. A student pilot should follow the flight instructor's advice on what and when to study. Planning a definite study program and following it as closely as possible will help in scoring well on the knowledge test. Haphazard or disorganized study habits usually result in an unsatisfactory score.

In addition to learning aeronautical knowledge, such as the principles of flight, a student pilot is also required to gain skill in flight maneuvers. The selected category and class of aircraft determines the type of flight skills and number of flight hours to be obtained. There are four steps involved in learning a flight maneuver:

- The CFI introduces and demonstrates flight maneuver to the student.

- The CFI talks student pilot through the maneuver.

- The student pilot practices the maneuver under CFI supervision.

- The CFI authorizes the student pilot to practice the maneuver solo.

Once the student pilot has shown proficiency in the required knowledge areas, flight maneuvers, and accrued the required amount of flight hours, the CFI endorses the student pilot logbook, which allows the student pilot to take the written and practical exams for pilot certification.

Knowledge and Skill Examinations

Knowledge Examination
The knowledge test is the computer portion of the exams taken to obtain pilot certification. The test contains questions of the objective, multiple-choice type. This testing method conserves the applicant's time, eliminates any element of individual judgment in determining grades, and saves time in scoring.

If pursuing a recreational pilot or private pilot certificate, it is important to become familiar with 14 CFR part 61, section 61.23, Medical Certificates: Requirements and Duration; 14 CFR section 61.35, Knowledge Test: Prerequisites and Passing Grades; and 14 CFR section 61.83, Eligibility Requirements for Student Pilot, for detailed information pertaining to prerequisites and eligibility.

If pursuing a recreational pilot certificate, it is important to review 14 CFR section 61.96, Applicability and Eligibility Requirements: General, for additional detailed information pertaining to eligibility; and if pursuing a private pilot certificate, 14 CFR section 61.103, Eligibility Requirements: General, contains additional detailed information pertaining to eligibility. Sample test questions can be downloaded from Airmen Knowledge Test Questions: www.faa.gov/education_research/testing/airmen/test_questions/.

Each applicant must register to take the test, and provide proper identification and authorization proving eligibility to take a particular FAA test. The option to take an untimed sample test will be offered. The actual test is time limited, but most applicants have sufficient time to complete and review the test. Upon completion of the knowledge test, the applicant receives an Airman Knowledge Test Report that reflects the score and is embossed with the testing center's seal. To pass, a minimum score of 70 must be attained.

When To Take the Examination
The knowledge test is more meaningful to the applicant and more likely to result in a satisfactory grade if it is taken after beginning the flight portion of the training. Therefore, the FAA recommends the knowledge test be taken after the student pilot has completed a solo cross-country flight. The operational knowledge gained by this experience can be used to the student's advantage in the knowledge test. The student pilot's CFI is the best person to determine when the applicant is ready to take the knowledge exam.

Where To Take the Examination
The FAA has hundreds of designated computer testing centers worldwide that administer FAA knowledge tests. These testing centers offer the full range of airman knowledge tests. Applicants will be charged a fee for the administration of FAA knowledge tests. A complete list of test centers, their locations and phone numbers can be downloaded at "Airmen Certification Frequently Asked Questions" located at www.faa.gov/education_research/testing/airmen/test_questions/ or www.faa.gov/licenses_certificates/airmen_certification/airmen_FAQ/.

An applicant can also contact the local FSDO to obtain this information. If the student pilot chooses a 14 CFR part 141 flight school with test examining authority, the school will administer the knowledge test during the curriculum.

Practical Examination
The FAA has developed PTSs for FAA pilot certificates and associated ratings. *[Figure 1-27]* These practical tests are administered by FAA ASIs and DPEs. 14 CFR part 61 specifies the areas of operation in which knowledge and skill must be demonstrated by the applicant. Since the
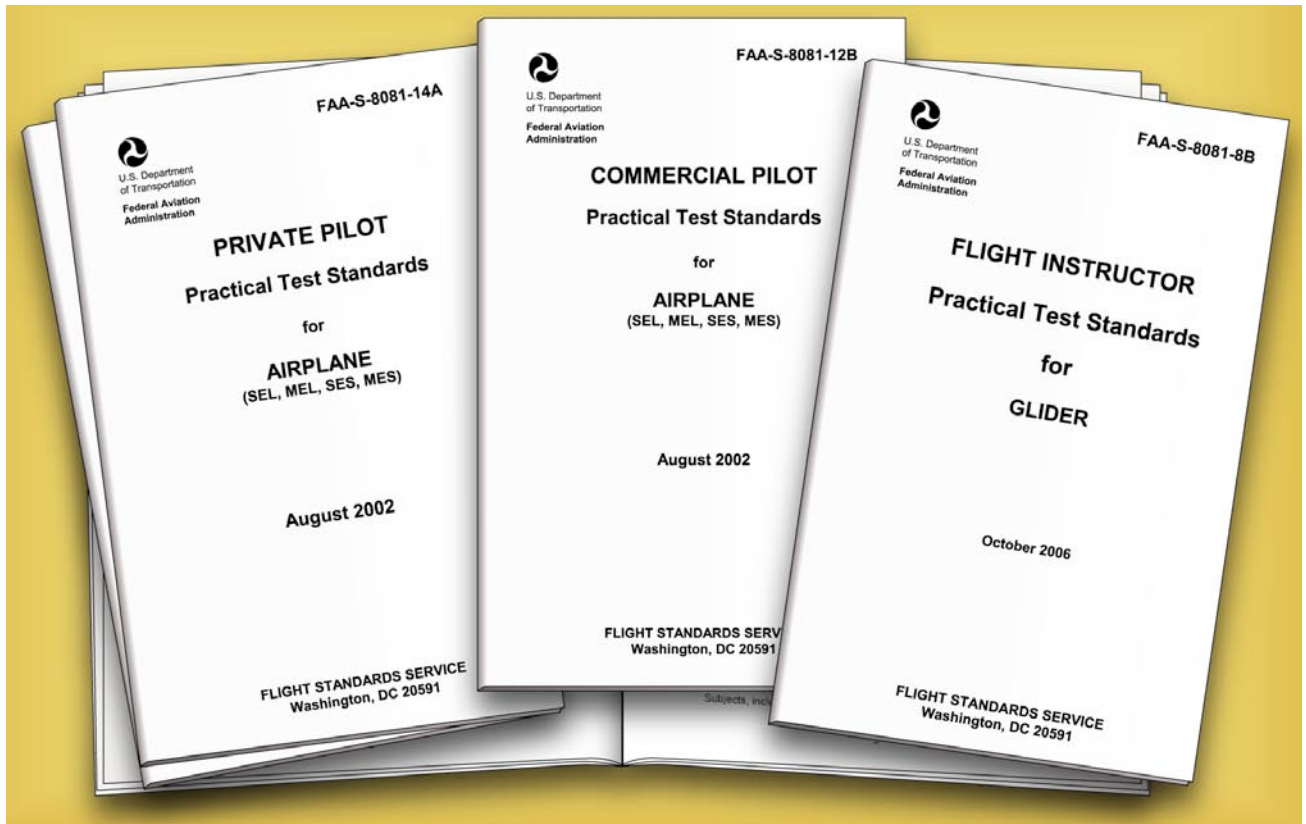
Figure 1-27. *Examples of Practical Test Standards.*

FAA requires all practical tests be conducted in accordance with the appropriate PTS, and the policies set forth in the Introduction section of the PTS book, the pilot applicant should become familiar with this book during training.

The PTS book is a testing document and not intended to be a training syllabus. An appropriately rated flight instructor is responsible for training the pilot applicant to acceptable standards in all subject matter areas, procedures, and maneuvers. Descriptions of tasks and information on how to perform maneuvers and procedures are contained in reference and teaching documents such as this handbook. A list of reference documents is contained in the Introduction section of each PTS book. Copies may obtained by:

- Downloading from the FAA website: www.faa.gov.

- Purchase of print copies from the GPO, Pittsburgh, Pennsylvania, or via their official online bookstore at www.access.gpo.gov.

The flight proficiency maneuvers listed in 14 CFR part 61 are the standard skill requirements for certification. They are outlined in the PTS as "areas of operation." These are phases of the practical test arranged in a logical sequence within the standard. They begin with preflight preparation and end with postflight procedures. Each area of operation

contains "tasks," which are comprised of knowledge areas, flight procedures, and/or flight maneuvers appropriate to the area of operation. The candidate is required to demonstrate knowledge and proficiency in all tasks for the original issuance of all pilot certificates.

When To Take the Practical Exam

14 CFR part 61 establishes the ground school and flight experience requirements for the type of certification and aircraft selected. However, the CFI best determines when an applicant is qualified for the practical test. A practice practical test is an important step in the flight training process.

The applicant will be asked to present the following documentation:

- FAA Form 8710-1 (8710.11 for sport pilot applicants), Application for an Airman Certificate and/or Rating, with the flight instructor's recommendation.

- An Airman Knowledge Test Report with a satisfactory grade.

- A medical certificate (not required for glider or balloon), and a student pilot certificate endorsed by a flight instructor for solo, solo cross-country (airplane and rotorcraft), and for the make and model aircraft

to be used for the practical test (driver's license or medical certificate for sport pilot applicants).

- The pilot log book records.
- A graduation certificate from an FAA-approved school (if applicable).

The applicant must provide an airworthy aircraft with equipment relevant to the areas of operation required for the practical test. He or she will also be asked to produce and explain the:

- Aircraft's registration certificate
- Aircraft's airworthiness certificate
- Aircraft's operating limitations or FAA-approved aircraft flight manual (if required)
- Aircraft equipment list
- Required weight and balance data
- Maintenance records
- Applicable airworthiness directives (ADs)

For a detailed explanation of the required pilot maneuvers and performance standards, refer to the PTSs pertaining to the type of certification and aircraft selected. These standards may be downloaded free of charge from the FAA: www.faa.gov. They can also be purchased from the Superintendent of Documents or GPO bookstores. Most airport fixed-base operators and flight schools carry a variety of government publications and charts, as well as commercially published materials.

Who Administers the FAA Practical Examination?

Due to the varied responsibilities of the FSDOs, practical tests are usually given by DPEs. An applicant should schedule the practical test by appointment to avoid conflicts and wasted time. A list of examiner names can be obtained from the local FSDO. Since a DPE serves without pay from the government for conducting practical tests and processing the necessary reports, the examiner is allowed to charge a reasonable fee. There is no charge for the practical test when conducted by an FAA inspector.

Role of the Certificated Flight Instructor

To become a CFI, a pilot must meet the provisions of 14 CFR part 61. The FAA places full responsibility for student flight training on the shoulders of the CFI, who is the cornerstone of aviation safety. It is the job of the flight instructor to train the student pilot in all the knowledge areas and teach the skills necessary for the student pilot to operate safely and competently as a certificated pilot in the NAS. The training will include airmanship skills, pilot judgment and decision-making, and good operating practices.

A pilot training program depends on the quality of the ground and flight instruction the student pilot receives. The flight instructor must possess a thorough understanding of the learning process, knowledge of the fundamentals of teaching, and the ability to communicate effectively with the student pilot. He or she uses a syllabus and teaching style that embodies the "building block" method of instruction. In this method, the student progresses from the known to the unknown via a course of instruction laid out in such a way that each new maneuver embodies the principles involved in the performance of maneuvers previously learned. Thus, with the introduction of each new subject, the student not only learns a new principle or technique, but also broadens his or her application of those principles or techniques previously learned.

Insistence on correct techniques and procedures from the beginning of training by the flight instructor ensures that the student pilot develops proper flying habit patterns. Any deficiencies in the maneuvers or techniques must immediately be emphasized and corrected. A flight instructor serves as a role model for the student pilot who observes the flying habits of his or her flight instructor during flight instruction, as well as when the instructor conducts other pilot operations. Thus, the flight instructor becomes a model of flying proficiency for the student who, consciously or unconsciously, attempts to imitate the instructor. For this reason, a flight instructor should observe recognized safety practices, as well as regulations during all flight operations.

The student pilot who enrolls in a pilot training program commits considerable time, effort, and expense to achieve a pilot certificate. Students often judge the effectiveness of the flight instructor and the success of the pilot training program based on their ability to pass the requisite FAA practical test. A competent flight instructor stresses to the student that practical tests are a sampling of pilot ability compressed into a short period of time. The goal of a flight instructor is to train the "total" pilot.

Role of the Designated Pilot Examiner

The DPE plays an important role in the FAA's mission of promoting aviation safety by administering FAA practical tests for pilot and Flight Instructor Certificates and associated ratings. Although administering these tests is a responsibility of the ASI, the FAA's highest priority is making air travel safer by inspecting aircraft that fly in the United States. To satisfy the need for pilot testing and certification services, the FAA delegates certain of these responsibilities to private individuals who are not FAA employees.

Appointed in accordance with 14 CFR section 183.23, a DPE is an individual who meets the qualification requirements of the Pilot Examiner's Handbook, FAA Order 8710.3, and who:

- Is technically qualified.

- Holds all pertinent category, class, and type ratings for each aircraft related to their designation.

- Meets requirements of 14 CFR part 61, sections 61.56, 61.57, and 61.58, as appropriate.

- Is current and qualified to act as PIC of each aircraft for which he or she is authorized.

- Maintains at least a Third-Class Medical Certificate, if required.

- Maintains a current Flight Instructor Certificate, if required.

Designated to perform specific pilot certification tasks on behalf of the FAA, a DPE may charge a reasonable fee. Generally, a DPE's authority is limited to accepting applications and conducting practical tests leading to the issuance of specific pilot certificates and/or ratings. The majority of FAA practical tests at the private and commercial pilot levels are administered by DPEs.

DPE candidates must have good industry reputations for professionalism, integrity, a demonstrated willingness to serve the public, and adhere to FAA policies and procedures in certification matters. The FAA expects the DPE to administer practical tests with the same degree of professionalism, using the same methods, procedures, and standards as an FAA ASI.

Chapter Summary

The FAA has entered the second century of civil aviation as a robust government organization and is taking full advantage of technology, such as Global Positioning System (GPS) satellite technology to enhance the safety of civil aviation. The Internet has also become an important tool in promoting aviation safety and providing around-the-clock resources for the aviation community. Handbooks, regulations, standards, references, and online courses are now available at the FAA website.

In keeping with the FAA's belief that safety is a learned behavior, the FAA offers many courses and seminars to enhance air safety. The FAA puts the burden of instilling safe flying habits on the flight instructor, who should follow basic flight safety practices and procedures in every flight operation he or she undertakes with a student pilot. Operational safety practices include, but are not limited to, collision avoidance procedures consisting of proper scanning techniques, use of checklists, runway incursion avoidance, positive transfer of controls, and workload management. These safety practices will be discussed more fully within this handbook. Safe flight also depends on Scenario-Based Training (SBT) that teaches the student pilot how to respond in different flight situations. The FAA has incorporated these techniques along with decision-making methods, such as Aeronautical Decision-Making (ADM), risk management, and Crew Resource Management (CRM), which are covered more completely in Chapter 17, Aeronautical Decision-Making.