



Chapter

16

AEROSPACE ORGANIZATIONS

There are many aerospace organizations that promote aerospace functions. Most of the ones discussed in this chapter are very well known. Several are important governmental aerospace organizations, but each has its own area of responsibilities. There are far too many non-governmental organizations that center on aerospace vehicles to mention in this book. Two of the largest and well-known organizations discussed are AOPA (Aircraft Owners and Pilots Association) and EAA (Experimental Aircraft Association). They both are very large organizations that promote the aerospace environment and are concerned with a wide variety of aerospace topics. There are also many industry related aerospace organizations. This chapter will cover several aerospace organizations. All of these organizations do their jobs very differently from each other, but all provide an immense service to the population.



Objectives

- Outline** the history of the Federal Aviation Administration (FAA).
- Describe** the FAA air traffic control system.
- Describe** the FAA system of flight standards.
- Discuss** the FAA National Aviation Facilities Experiment Center and the FAA Aeronautical Center.
- Explain** the responsibilities of the National Transportation Safety Board.
- Describe** the function of NASA.
- Describe** the function of the ICAO.
- Discuss** the makeup and the role of the Civil Reserve Air Fleet.
- Describe** the three missions of Civil Air Patrol.
- Describe** the functions of AOPA, EAA.

Governmental Organizations

Federal Aviation Administration

The Federal Aviation Administration (FAA) is the United States Government agency that is responsible for regulating air commerce. It helps by improving aviation safety, promoting civil aviation, a national system of airports, and developing and operating a common system of air traffic control for all aircraft.

History

The regulation of air traffic by the United States Government began with the passage of the Air Commerce Act of 1926. This law gave the Federal Government the responsibility for the operation and



maintenance of the airway system over the United States, including all aids to air navigation. It also authorized the Department of Commerce to develop a system of regulations, which would provide safety in air commerce. The Bureau of Air Commerce was established within the Department of Commerce to carry out these programs.



The first safety regulations developed were the requirements for registration and licensing of aircraft, and the certification and medical examination of all pilots. The Bureau of Air Commerce did much to improve aviation radio and other navigational aids. It also promoted airport construction throughout the country, but it did not provide financial assistance for building airports.

Civil Aeronautics Act - 1938. By 1938, the carrying of airmail and passengers had increased significantly, making new legislation necessary. The new law governing civil aviation was called the Civil Aeronautics Act of 1938. This act placed all air transportation regulations, both economic and safety, under three

separate agencies. The first was the Civil Aeronautics Authority, which established policies governing the safety and economics of air transportation. The second was the Office of the Administrator of Aviation, which was formed to carry out the safety policies of the Civil Aeronautics Authority. The third was the Air Safety Board, which was formed to investigate aircraft accidents.

In 1940, the Civil Aeronautics Act was amended, and the three agencies were reduced to two. The Civil Aeronautics Board (CAB) took over the policy-making responsibility in both safety and economic matters. It also assumed the accident investigation duties of the Air Safety Board. The second agency was the Civil Aeronautics Administration (CAA). It was charged with executing the safety regulations developed by the CAB and with operation of the airway system. The CAA was placed under the Department of Commerce.

Federal Airport Act - 1946. The Federal Airport Act of 1946 provided for the CAA to design a system of airports throughout the United States using federal funds for their development. This legislation was needed because of the tremendous increase in aviation activity after World War II. The Federal Airport Act of 1946 was amended several times, but it remained in effect until the Airport and Airway Development Act of 1970 was passed in June 1970.

Federal Aviation Act - 1958. The Civil Aeronautics Act remained in effect for 20 years (1938 - 1958) before the regulation of civil aviation was again changed by the Federal Aviation Act of 1958. The biggest change provided by this act was that the CAA, which was part of the Department of Commerce, became an independent agency—the Federal Aviation Agency (FAA). The Federal Aviation Act of 1958 removed the responsibility for developing safety regulations from the CAB and gave this responsibility to the newly formed FAA. In effect, this gave the FAA the responsibility for both developing safety regulations and enforcing them. The CAB retained its responsibility for economic regulation of air commerce and the investigation of aircraft accidents.

Department of Transportation Act - 1966. The final change in the status of the FAA came with the Department of Transportation Act, passed in 1966. This act placed all public transportation under a single manager, the Department of Transportation. The duties and responsibilities of the FAA remained unchanged, but the name was changed to the Federal Aviation Administration. During its history, the

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present-day FAA has been called the Bureau of Air Commerce, the Administration of Aviation, the Civil Aviation Administration and the Federal Aviation Agency.

Duties and Responsibilities

Air Traffic Control. One of the FAA's biggest tasks in the area of aviation safety is the control of air traffic. Air traffic control is concerned with keeping aircraft safely separated to prevent accidents. This is necessary while aircraft are taxiing, taking off, climbing, en route, and approaching and landing. The FAA also provides preflight and in-flight services to all pilots for air traffic control and safety purposes.

Air traffic control is accomplished by establishing certain parts of the airspace as controlled airspace and by requiring that all aircraft flying within this controlled airspace follow certain rules and regulations.

There are two types of facilities that control the Instrument Flight Rules (IFR) traffic flying within the controlled airspace. The first type is the Airport Traffic Control Tower, which controls traffic departing or arriving at certain airports. The control tower is equipped with complex electronic equipment and is operated by highly skilled FAA air traffic controllers. The tower also controls aircraft taxiing on the ground. As would be expected, the busier the airport and the more types of aircraft it handles, the more restrictive are the rules and regulations. Certain large metropolitan airports require all aircraft using the facility to be equipped with various types of traffic control equipment. Some of this equipment is



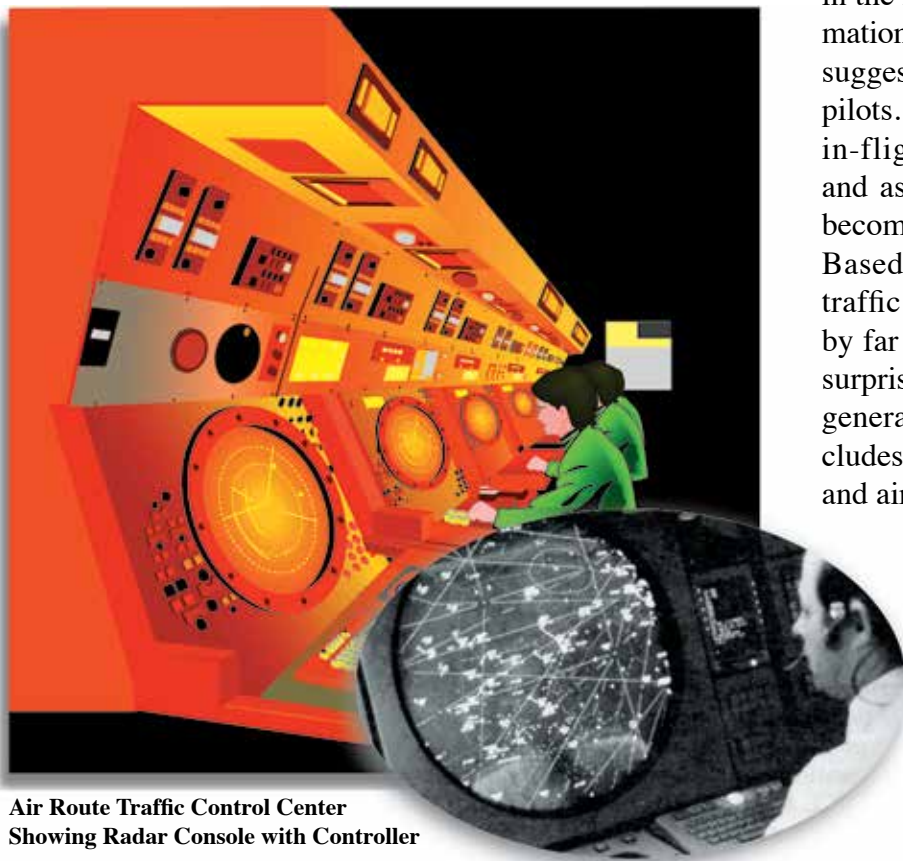
Based on the volume of aircraft traffic handled, the Flight Service Station provides by far the most service, including in-flight information and assistance in the event a pilot becomes lost or is having trouble. Pictured here is the FAA Flight Service Station in Denver, Colorado.



very expensive, and many general aviation pilots cannot afford it. They are restricted from using these large airports.

After the IFR aircraft leaves the immediate area of the airport, the controller in the tower will “hand it off” (transfer it) to another air traffic controller in the second type of facility known as the Air Route Traffic Control Center (ARTCC). The ARTCC assigns the aircraft a certain altitude and a specific route to follow to its destination. The pilot must not change the route or the altitude without permission. As the flight continues, the aircraft is transferred from one ARTCC to another. The flight is under positive control at all times, and no other aircraft is allowed to enter that aircraft’s “piece of airspace.” The ARTCCs follow the flight on radars and are in voice communications at all times. Commercial airliners, general aviation, and military aircraft all use the same traffic control system when flying within the controlled airspace using IFR.

The FAA also provides assistance to pilots who do not fly within the controlled airspace. These are mostly general aviation pilots since most airline and military aircraft are required to fly IFR at all times. This assistance is provided by the Flight Service Station (FSS). The FAA personnel who work



**Air Route Traffic Control Center
Showing Radar Console with Controller**

in the FSSs provide preflight information such as weather information, suggested routes, altitudes, etc., to pilots. In addition, the FSS provides in-flight information, via radio, and assistance in the event a pilot becomes lost or is having trouble. Based on the volume of aircraft traffic handled, the FSS provides by far the most service. This is not surprising since they handle mostly general aviation traffic, which includes over 90 percent of all pilots and aircraft.

The control towers, centers, and flight service stations are all connected and work closely together to keep a safe and orderly flow of traffic.

The system is currently very heavily loaded. The FAA is modernizing and updating all of its equipment to handle the increase in traffic.

Airway Facilities. The nation’s airways are a 250,000-mile system of highways in the sky which pilots follow from takeoff to landing. Currently, the heart of the system is the Very High Frequency Omni-Directional Range (VOR) system, which covers the United States. These VORs are used for



navigation along the airways. The FAA is responsible for operation and maintenance of these facilities. They also own and maintain other radars, instrument landing systems and communications at the various airports. These facilities are checked regularly by specially instrumented FAA aircraft.

Flight Standards. The FAA is responsible for ensuring that all pilots and aircraft are safe through enforcement of a system of flight standards. These standards ensure that all aircraft are airworthy, all airmen (pilots, navigators, air traffic controllers, engineers, mechanics, etc.) are competent and all regulations and procedures are followed.

All new models of aircraft, engines, instruments or other components must meet very rigid safety standards before the FAA certifies them. When a manufacturer brings out a new aircraft, the FAA works with the engineers and designers during construction of the prototype. It is then thoroughly ground-tested and flight-tested before being given a type certificate. This certificate confirms that this type of aircraft has met FAA standards of construction and performance. A production certificate is later provided, which shows that the manufacturer can duplicate the aircraft that was type certificated. The production certificate allows the manufacturer to continue to produce that type of aircraft. As each production aircraft is built, it must be issued an airworthiness certificate, which ensures that it has been tested and is safe for use.

Even after an aircraft starts flying, the FAA continues to check its safety. They control aircraft maintenance programs by setting times for inspection and overhaul. The FAA also certifies the repair and overhaul facilities to ensure that the aircraft receives proper maintenance and repair.

Before flying an aircraft, a pilot must have a FAA-issued pilot certificate. There are many types of certificates, but in all cases, they certify that the holder has passed medical examinations. The FAA also requires that a physical examination and a flight-check ride with a flight instructor be completed every 2 years.

Research and Development. The National Aviation Facilities Experiment Center (NAFEC) is the FAA's research and development center. This center, located in Atlantic City, New Jersey, is involved in research to upgrade our airway systems, to improve aircraft instruments and systems, and to reduce the workload on the pilot in the aircraft and the controller on the ground. All of these efforts are expended to make flying easier and safer.

The NAFEC is currently working on new types of airway navigational systems, which will reduce the congestion of our airways in the future. Another area, which they are working on, is new instrument landing systems which would allow aircraft to land safely in any type of weather regardless of visibility.

They are also involved in research on collision avoidance systems for use in aircraft. This would provide a warning to both pilots any time two aircraft were on a course that would lead to a collision. The system would also tell the pilots the type of evasive action to take to avoid a collision.

Aeronautical Center. Another facility operated by FAA is the Aeronautical Center in Oklahoma City, Oklahoma. This multi-million dollar facility is the home of the FAA Academy, which is the training center for FAA operational personnel. They train the personnel who operate the ARTCCs, FSSs and airport control towers. In addition to training FAA control tower operators, they also train controllers for the military and for many foreign countries. The academy is also the training ground for the engineers and technicians who install and maintain the electronic equipment used for navigation, communications and air traffic control. Finally, the academy also provides initial and refresher training for their



maintenance inspectors. The Civil Aeromedical Institute (CAI) is also located at the Aeronautical Center. The CAI operates the program for medical certification of all airmen. It is also involved in research to identify human factors that cause aircraft accidents and how to make accidents more survivable. The Aeronautical Center is also the home of the people who write the airmen examinations, develop the airworthiness standards for all civil aircraft, and keep all the records of airmen and aircraft. The pilots and aircraft that fly the inspections of the airways and airport control and communications equipment are also based at the Aeronautical Center.

National Transportation Safety Board

The National Transportation Safety Board (NTSB) is a five-member board appointed by the President, with the advice and consent of the Senate. The members of the NTSB are appointed for a term of 5 years and, like the CAB, there can be no more than three members from any one political party.

The NTSB is responsible for determining the cause, or probable cause, of any transportation accident. Under the chairman of the NTSB, the Bureau of Aviation Safety carries out these duties in the area of aviation. The Bureau of Aviation Safety makes rules governing accident reporting. They also investigate all aircraft accidents (they have delegated this duty to the FAA in the case of general



Experts will be assisting in determining the cause of this crash.

aviation accidents), report the facts relating to each accident and the probable cause, and make recommendations to FAA as to how to prevent similar accidents. The NTSB maintains its own technological division, which provides engineering and technical assistance in areas of aerodynamics, structures, propellers, power plants, instruments, electronic aids to navigation, human factors, etc. These experts



are available to assist in determining the causes of various accidents. They also assist the manufacturers in making their aircraft safer.

The result of these agencies working together to promote aviation safety is an air transportation system that is safer than any other form of public transportation.

National Aeronautics and Space Administration

The National Aeronautics and Space Administration (NASA) is a government organization that is very well known throughout the world. Most everyone thinks space exploration when they think NASA. It is much more than just space. You will be learning a great deal about NASA in the following chapters about space; mostly about the spacecraft and not the organization itself.

NASA's budget is under one percent of the federal budget, or over \$13 billion, and is divided into four strategic enterprises. They are Science, Aeronautics, Space Operations, and Human Exploration and Development of Space. To support these strategic enterprises, NASA employs 18,500 civil servants and is divided into nine field centers, the contractor-operated Jet Propulsion Laboratory and the Wallops Flight Facility. Each of these facilities directly supports one or more of the strategic enterprises.

NASA's mission statement is threefold and is directly supported by the strategic enterprises. The first part is to explore, use and enable the development of space for human enterprise. The second part is to advance scientific knowledge and understanding of the earth, the solar system and the universe and use the environment of space for research. The third part is to research, develop, verify and transfer advanced aeronautics, space and related technologies. NASA contributes a great deal to the goals of the United States and the world. It promotes economic growth and security to America by conducting aeronautics, and space research and development in partnership with industry, academia and other federal agencies to keep America capable and competitive. It helps to preserve the environment through studies of earth as a planet and a system, enabling the world to address environmental issues. It engages the educational world by directly supporting and encouraging



America leads the world in aerospace technology. (EAA)



learning through its many educational endeavors. It also promotes world peace through the exploration and discovery of the universe for all mankind.

NASA research has many great spin-offs of technology to our society. Our space program did not directly develop such things as solid-state televisions, pocket calculators or microwave ovens, but these items and thousands more are spin-offs of aerospace technology. Other things we can list are glasses that darken as the light becomes brighter, digital watches and tiny nickel cadmium (NiCad) batteries. Small hearing aids in the bow of your glasses and artificial pacemakers for heart patients are also spin-offs of aerospace technology.

In the area of materials, we have new temperature-resistant metals, extra strong plastics, bonded lubricants, super insulators and composite materials, which were developed for our space effort. These are now being used in aircraft, automobiles, sporting goods, houses, etc. How do you judge the value of these spin-off products? The answer will vary for each individual. If you are one of the more than 2,000,000 people being kept alive by an artificial heart pacemaker, your answer will probably be that it is very valuable.

International Civil Aviation Organization (ICAO)

The ICAO is an international organization dedicated to standardizing aviation functions. Originally started on December 7, 1944, it was completely ratified by the member countries on April 4, 1947. Later that year, it became a special agency of the United Nations linked to the Economic and Social Council. Today, almost all nations of the world follow the ICAO rules.

The primary ICAO activity is standardization. It provides a means and forum for countries to standardize the many activities associated with aviation. Some of the subject areas standardized are rules of the air, aeronautical meteorology, aeronautical charts and symbols, air traffic services, search and rescue, aeronautical information services, airspace designations, airports and even language. The universal aviation language is English. All pilots and controllers in foreign countries must be able to speak and understand English to use the ICAO system. These standards are constantly reviewed for changes as technology changes aviation. The overall goal of the ICAO is to make the skies safer and more prosperous for all aircraft. Without these standards in place, international air travel would be very close to impossible. The ICAO has made air travel a much safer and easier place in which to operate.

Civil Reserve Air Fleet

The Civil Reserve Air Fleet (CRAF) is composed of commercial airliners, which have been designated by the Department of Defense for use in time of national emergency. These aircraft are long-range jet transports, which have been specially equipped so they can be quickly converted for military use. The CRAF is subject to call on a 24-hour notice. However, the CRAF is more than just aircraft, it also includes aircrews and maintenance crews supplied by the airlines.



When activated, the CRAF would provide the armed forces with modern, fast aircraft capable of airlifting troops and supplies to any point on the earth's surface. The capability of the CRAF continues to expand as more of the newer and larger jumbo jets are added to airline service.

The CRAF was established to assist the military in case of a national emergency, but it is also available for use in case of a natural disaster. In this case, only a small portion of the CRAF would be activated to provide airlift assistance to earthquake, flood or drought victims.

Civil Air Patrol



National Headquarters Civil Air Patrol, Maxwell Air Force Base, Alabama

The Civil Air Patrol (CAP) is a federally chartered, private, nonprofit corporation and is also the official civilian auxiliary of the United States Air Force. The over 60,000 volunteer members are aerospace-minded citizens dedicated to service for their fellow Americans. CAP has three basic missions—emergency services, aerospace education, and cadet programs.

Emergency Services. CAP uses more than 580 corporate-owned and 4,400 member-furnished aircraft to fly various emergency missions. These include search and rescue (SAR) missions for downed aircraft, lost hunters, fishermen, children, etc.; disaster relief missions for natural disaster; and, emergency airlift missions of sick or injured persons, as well as transporting blood and body organs.

Aerospace Education. CAP conducts an aerospace education program for its membership and for the general public. This program develops an awareness and appreciation of the aerospace world



CAP Emergency Services

in which we live. CAP's involvement in aerospace education includes sponsorship of workshops for teachers, and development of curriculum and other materials to help teach aerospace education to all grade levels.



Aerospace Education in All Grades

Cadet Programs. CAP cadets are young men and women, ages 12 to 21, who are interested in aerospace and in community service. The cadet program is structured to use aerospace as a vehicle to help teach leadership and management skills, moral leadership and physical fitness. The program emphasizes activities and involvement of the cadets.

CAP was founded in 1941, and for 60 years, the CAP members have been involved in service to their communities and their nation.

CAP Cadets experience flight.





Nongovernmental Organizations

Aircraft Owners and Pilots Association (AOPA)



AOPA was founded in 1939 to support the views and rights of aircraft owners and pilots. It has continuously built on this premise. Today, it is the leading voice among aircraft owners and pilots to Congress and the FAA. It continuously monitors the government very carefully and, in partnership with the government, strives to make the skies safer for all who use it. One of the most renowned suborganizations within AOPA is the Air Safety Foundation.

Founded in 1950, the Air Safety Foundation is the nation's largest organization dedicated to providing aviation education and safety programs for general aviation. It accomplishes this through researching accidents, distributing safety related materials to pilots, conducting training and providing free public-service aviation safety seminars.

Experimental Aircraft Association (EAA)



One of the fastest growing areas of aviation is the homebuilt market. The EAA was formed to help builders to safely construct and fly their aircraft. It is one of the largest general aviation organizations, along with AOPA. Its local chapters provide builder training and education. EAA supports all sport aviation including antique aircraft, warbirds and ultralights. It also works with the government to ensure the voice of general aviation is heard and understood. Each year, it



EAA Headquarters, Oshkosh, Wisconsin (EAA)



holds one of the largest airshows in the world at Oshkosh, Wisconsin. During the weeklong airshow, it becomes the busiest airport in the world, logging more takeoffs and landings than the busiest commercial airports in the world. At the airshow, there are many events that teach and inform builders and pilots on new rules and laws, building techniques and new aircraft. It also sponsors workshops and provides hands-on training in aircraft construction and maintenance.



The EAA Annual Fly-in in Oshkosh is the world's largest airshow. (EAA)

Industry Organizations

The aerospace industry is composed of hundreds of companies, large and small, that are involved in some form of manufacturing related to aircraft, missiles, spacecraft and their parts and accessories. Fifty-two of these industries belong to a professional organization—the Aerospace Industries Association (AIA). Some of the industries that belong to AIA are the Boeing Company, Northrup-Grumman Corporation, Bell Helicopter, Textron, Lockheed-Martin Corporation, Honeywell Incorporated, General Dynamics, Raytheon Corporation, General Electric Company and McDonnell-Douglas Corporation. Many of the manufacturers of general aviation aircraft like Cessna, Piper, Beech, etc., are not members of AIA, but they have their own professional organization—General Aviation Manufacturers Association (GAMA). There are about 54 manufacturers that belong to GAMA including many that build engines (Lycoming), instruments (NARCO), radios (King) and other equipment for general aviation aircraft.

The industries, which are involved in aerospace manufacturing, are considered high-technology



industries. This means that the areas they work in are involved in the most modern, up-to-date areas of applied research. Because of the highly technical nature of the work in the aerospace industries, the personnel tend to be very skilled and more highly trained than in the average manufacturing industry. This is true for production workers, managers, scientists and engineers. As a result, salaries generally average higher in the aerospace industries.



Key Terms and Concepts

- Federal Aviation Administration (FAA)
- Air Commerce Act of 1926
- Civil Aeronautics Act (1938)
- Civil Aeronautics Board (CAB)
- Civil Aeronautics Administration (CAA)
- Federal Airport Act of 1946
- Federal Aviation Act of 1958
- Air Traffic Control
- Instrument Flight Rules (IFR)
- Air Route Traffic Control Center (ARTCC)
- Flight Service Station (FSS)
- National Aviation Facilities Experiment Center (NAFEC)
- Civil Aeromedical Institute (CAI)
- National Traffic Safety Board (NTSB)
- Bureau of Aviation Safety
- National Aeronautics and Space Administration (NASA)
- International Civil Aviation Organization (ICAO)
- Civil Reserve Air Fleet (CRAF)
- Civil Air Patrol (CAP)
- Aircraft Owners and Pilots Association (AOPA)
- Experimental Aircraft Association (EAA)
- Aerospace Industries Association (AIA)
- General Aviation Manufacturers Association (GAMA)



? Test Your Knowledge ?

SELECT THE CORRECT ANSWER

1. The **(FAA / CAB)** has responsibility for economic regulation of air commerce and the investigation of aircraft accidents.
2. The **(FSS / IFR)** provide preflight information such as weather, suggested routes, and altitudes to pilots.
3. The **(NAFEC / Bureau of Aviation Safety)** conducts research to upgrade the airway system, improve aircraft instrumentation, and reduce the workload on pilots and controllers.
4. The **(NTSB / FAA Aeronautical Center)** investigates all transportation accidents.
5. **(NASA / NAFEC)** controls the contractor operated Jet Propulsion Laboratory and the Wallops Flight Facility.
6. **(IFR / ICAO)** is a special agency of the UN linked to the Economic and Social Council.

FILL IN THE BLANKS

7. The _____ (FAA) was created as an _____ by the the Federal Aviation Act in 1958. It replaced the _____ (CAA), which had been under the Department of _____. As such, the FAA was now tasked with both developing _____ and _____ them. In 1966, the name was changed to _____ (still abbreviated FAA) and they were placed under the Department of _____, with all other public transportation.
8. _____ controls the aircraft while on the ground and during takeoffs and landings. After takeoff, they are handed off to _____, who assigns a specific route and altitude to fly. The flight is under _____ at all times, as the aircraft is passed from one sector to another. As the aircraft approaches its destination, it is again handed off to the _____ for its arrival instructions.
9. FAA flight standards ensure that all _____ are airworthy by being type certified, and that all _____ meet competency requirements through checkrides and evaluations.
10. _____ is the universal language of aviation.
11. The _____ is the international organization dedicated to standardizing aviation functions.
12. _____ was founded in 1939 to support the views and rights of its members, and as their voice to Congress and the FAA.
13. The _____, one of the largest general aviation organizations, was formed to help builders safely construct and fly their aircraft.



TRUE OR FALSE _____

14. *The FAA currently falls under the Department of the Interior.*
15. *NASA research has provided many great spin-off technologies to our society.*
16. *The heart of the airways system in the United States is the Very High Frequency Omni-Directional Range system, which covers the country.*
17. *CRAF only applies to aircraft, not crews or maintenance personnel.*
18. *The Civil Air Patrol is federally funded, public and unofficial auxiliary to the USAF.*
19. *The Air Safety Foundation is a small organization providing aviation education and safety programs for commercial aviation under the auspices of the FAA.*

SHORT ANSWER _____

20. *What does the acronym NAFEC mean? What is it? Name three areas where they are currently working on improvements mentioned in the text.*
21. *What is done at the FAA Aeronautical Center?*
22. *What does the acronym NTSB mean? What is their primary responsibility?*
23. *What are the three main tenets of the NASA mission statement?*
24. *What does the acronym CRAF mean? What will it do for the Department of Defense?*
25. *Briefly describe the three missions of the Civil Air Patrol.*