



PAUL CIANCIOLO

## Exploring Lifecycle of an Aircraft

**A**re you waiting for that electric or hybrid aircraft to come out so you can save money and not rely on avgas? Would you feel comfortable flying in a new “green” airplane? Rest assured that by the time it gets to you in the general aviation community, it will be safe to fly.

The FAA’s Aviation Safety organization (AVS), with its more than 7,400 employees, directs and manages the safety programs that focus on aviation safety in the interest of the American public and the millions of people who rely on the aviation industry for business, pleasure, and commerce.

Let’s take a look at how all the pieces of AVS work together during the lifecycle of an aircraft, which falls into three primary areas — standards, certification, and continued operational safety. The process of certifying an aircraft is complicated, but once it’s understood, one should feel confident that the next generation of aircraft will be safe to fly.

### Standards

With certain limited exceptions, FAA’s Aviation Safety organization sets safety standards for the people, organizations, aircraft, and products that operate in the National Airspace System. The organization is responsible for the certification, production approval, and continued airworthiness of aircraft, and for the certification of pilots, mechanics, and others in safety-related positions. The many offices of AVS all work together in the process of settings standards.

### FAA Aviation Safety Offices

- Flight Standards Service (AFS)
- Aircraft Certification Service (AIR)
- Aerospace Medicine (AAM)
- Air Traffic Safety Oversight Service (AOV)
- Accident Investigation and Prevention (AVP)
- Rulemaking (ARM)
- Quality, Integration & Executive Services (AQS)

*Except for AVP, ARM, and AQS, the offices have an extensive local field presence. Also, AOV is the independent oversight of the air traffic control organization, not the actual controllers.*

As an example, AFS sets the standards for an airman to be certificated as a pilot, for an operator to fly passengers, and for a school to train an aviation maintenance technician. ARM manages the rulemaking process. AIR administers safety standards governing the design, production, and airworthiness of aeronautical products. In addition, to ensure compliance with prescribed safety standards, AIR oversees design, production, and airworthiness certification programs, and issues Airworthiness Directives to correct an unsafe condi-

tion that exists in a product that is likely to develop in a product of the same type-design. AAM develops and implements the medical standards for airmen. And AOV is responsible for reviewing all changes to air traffic control procedures.

## Certification

Broken down into five parts, the certification process allows people, organizations and equipment to operate in our airspace. It allows manufactures to build aircraft, aircraft engines, propellers, and parts, and it allows organizations to provide the required maintenance services.

## Design & Development

Photo courtesy of Cirrus Aircraft



*The 2013 Cirrus Perspective is an integrated avionics suite built by Garmin, which uses technology in ways not possible in off-the-shelf products.*

Will it fly, and will it fly safely? AIR issues design approvals in the form of type certificates for aircraft, aircraft engines, and propellers. The proposed design must comply with airworthiness standards. However, experimental aircraft and special light-sport aircraft are not type certificated. ARM also coordinates the process to adopt the regulatory standards.

## Production

Photo courtesy of Cessna Aircraft



*Single engine aircraft are being assembled and painted at the Cessna facility in Independence, Kan.*

It's time to build and sell the aircraft. AIR issues production approvals and airworthiness certificates. Airworthiness certificates are often issued by designees. AIR also conducts oversight to determine that a manufacture's quality control system is functioning.

## The Written Word, Simplified

What are the rules and regulations you ask? Let's start from the top.

### 1. Statutes

Congress passes statutes, which are law. FAA is granted authority from Congress to promulgate regulations under Title 49, United States Code, Subtitle VII-Aviation Programs. Within the FAA, the authority for aviation safety regulation and oversight is delegated to the AVS organization. Sometimes state and local statutes may also be passed dealing with aviation. This is the law of the "air," which is usually broad in nature.

### 2. Regulations

The FAA then regulates the aviation industry. These rules, or regulations, are found in Title 14, Code of Federal Regulations (14 CFR), which is online at [www.ecfr.gov](http://www.ecfr.gov). The regulations specified in 14 CFR are the rules enforced by AVS.

### 3. Policy

An order is written by AVS and is a publically accessible document via the Regulatory Guidance Library ([rgl.faa.gov](http://rgl.faa.gov)). It provides FAA personnel with policies, procedures, and guidelines for ensuring compliance. Advisory Circulars (AC) are issued by AVS as way for the airman to comply with the regulations. The proposed actions of these policies are not enforceable but highly recommended.

## People



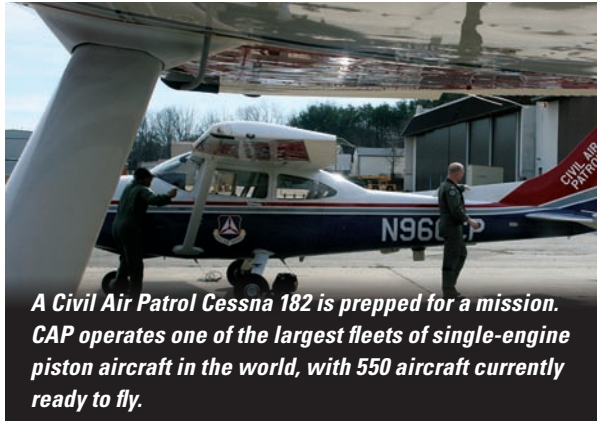
Photo by CAP Col. Jane Davies

*As a Civil Air Patrol cadet, Matthew Walters pays careful attention to a preflight checklist while going through a flight training academy.*

Someone has to fly it. AFS certicates the pilots who fly and the mechanics and repairmen who maintain the aircraft. AAM establishes standards used to certify that airmen are medically fit to fly and clears air traffic controllers for duty. AOV credentials air traffic safety personnel. And individuals from the private sector are often appointed by the FAA to aid in these processes.

## Operations

Photo by Paul Cianciolo



**A Civil Air Patrol Cessna 182 is prepped for a mission. CAP operates one of the largest fleets of single-engine piston aircraft in the world, with 550 aircraft currently ready to fly.**

Now the aircraft is ready for routine flight. Air carriers, commercial operators, pilot schools and training centers are certificated by AFS to keep the aircraft in the air and operated by trained personnel.

## Maintenance & Modifications

Photo courtesy of Cirrus Aircraft



**This infrared camera is available on new Cirrus aircraft and can be retrofitted to existing type certificated aircraft by a certified facility to improve situational awareness and safety. The system's camera is mounted in a pod under the left wing and has sensors for both ambient and infrared light, with both images merged on a display inside the cockpit.**

To keep the aircraft flying, routine maintenance needs to be performed and upgrades completed as new technology comes out. AFS issues certificates to repair stations. And AIR approves major design changes, which is often done through the use of designees

## Continued Operational Safety

All offices in FAA's Aviation Safety organization ensure that existing certificate holders continue to meet requirements, standards, and regulations.

AFS does this through inspecting the people, aircraft, and the organizations that operate in the airspace system. Conducting surveillance in all areas of air commerce is the most significant duty of AFS. AFS personnel also investigate causal factors of problem areas, enforce FAA regulations, maintain

the Civil Aviation Registry and promote a systematic approach to safety oversight.

AIR ensures continual operational safety by monitoring the design, production, and operation of certificated products. A change to a design generally must maintain the same level of safety as originally certified. AIR uses data gathered to detect safety concerns and take correct action before it can lead to an accident.

And it's just as important to make sure that the people flying the aircraft continue to be medically fit according to standards developed by AAM. Aerospace medical education programs, human factors research, and medical services and research for civil aircraft accidents are the other integral areas covered by AAM.

To ensure that the airspace continues to remain safe, AOV monitors, reviews, and analyzes the daily operations of the National Airspace System to spot trends and issues. AOV also audits FAA's air traffic control systems through independent oversight.

AVP is the FAA's main interface to the National Transportation Safety Board (NTSB). In the event of an aircraft accident, NTSB determines the probable cause. The FAA always investigates accidents for regulatory compliance and shares information with the NTSB for their determination of probable cause.

Holding it all together is AQS, which oversees numerous support activities, including information technology services, human resources, internal and external communications, safety management systems, the AVS budget, and environmental protection compliance.

As the prop keeps turning, so does the FAA in keeping up with new technology. If a change is needed as the result of an event — an accident, incident, or new technological development — then the process of continual improvement helps to ensure the safety of the airspace system. The lifecycle of an aircraft is a continuous cycle of setting standards, certifications, and continued operational safety, which is the job of FAA's multifaceted Aviation Safety organization. Next time you fly your aircraft, remember that all the rules and regulations are there to keep you safe. ✈️

---

*Paul Cianciolo is an assistant editor and the social media lead for FAA Safety Briefing. He is a U.S. Air Force veteran, and a rated aircrew member and search and rescue team leader with the Civil Air Patrol.*