Federal Aviation
Administration

Transport Certification Update

Inside...

Synthetic Vision, Class B Cargo Compartments, and more. . . .

Cover photo courtesy of airliners.net, © 2006
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For more about this image, see page 12.

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Northwest Mountain Region, Federal Aviation Administration,
Department of Transportation

Transport Certification Update

From the Directorate Manager

Welcome to Edition 24 of the *Transport Certification Update*. I'd like to thank those of you who have already subscribed, and in particular those who have commented on previous issues. Let me explain how this sharing of information can help us take a positive step toward further enhancing our safety culture.

Today there is a significant emphasis on implementing safety management systems (SMS) in aviation. Within the FAA, the Aviation Safety (AVS) organization has begun to develop critical foundational elements of a successful SMS. Other authorities are in various stages of transition to an SMS.

The AVS SMS will be based on four components:

- Safety Policy
- Safety Risk Management
- Safety Assurance
- Safety Promotion

Full implementation is a few years away, but I believe the foundation is very solid. We should keep these four components in mind as we go about our daily business.

The *Update*'s attempts to share regulatory information and communicate the regulatory safety programs and policies fit well within the fourth SMS component: Safety Promotion. Safety Promotion includes the actions taken to create an environment where safety objectives can be achieved. The key objective is a positive safety culture, characterized by an adequate knowledge base, competency, tools, communications, training, and information sharing. As the office responsible for rulemaking and policy development for large transport aircraft, we in the Transport Airplane Directorate must provide manufacturers and FAA designees with the latest information. The *Update* is one tool that will help us communicate this information.

Since October 2006, over 800 subscribers in over 30 countries have signed up to receive the *Update*. We expect this number to increase rapidly. Through your feedback to our email address (9-ANM-TAD-Update@faa.gov), the *Update* can play an even more beneficial role in communicating the needs and concerns of aviation safety. We want to hear from you on specific areas of interest. Tell us what you'd like us to focus on, and how we can better meet your expectations. By providing input to us, you will help us succeed in this small endeavor toward the much larger Safety Promotion component of AVS SMS.

Ali Bahrami

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[Transport Airplane Directorate Web Site]

Transport Airplane Directorate (TAD) Organization

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Flight testing a synthetic vision system, from *Synthetic Vision, Part 1*.

Photo courtesy of the NTSB

The aftermath of a cargo fire, from *Class B Cargo Compartments*

Coming in Future Editions:

- Synthetic Vision, Part 2
- Aging Airplanes
- What Every Designee Needs to Know about Airworthiness Directives

Contact Us:

If there is a topic you would like to read about, or if you have a question or comment, please e-mail us: 9-ANM-TAD-Update@faa.gov.

Synthetic Vision, Part 1

In this first article about synthetic vision, we present a description and brief history of this emerging technology

Early aviators could not envision, but probably would have appreciated, one of today's emerging technologies: a synthetic vision (SV) system. Although SV is not a substitute for landing instruments, it does give the pilot a display of computer-generated terrain database imagery that corresponds to the real world terrain outside the airplane and matches the airplane's course of travel.

Early SV efforts — primarily by the military in the 1950s — were suspended because the technology of the day (displays, processors, graphics capability, and database storage) was inadequate for developing a viable product. Today, database storage is available and relatively inexpensive, and it's now possible to create compelling and reasonably accurate computer-generated graphics.

A terrain database and computer display allow the pilot to see a graphic representation of the real-world scene. The graphics include terrain and add major water features, obstacles (from an obstacle database), and airports. Some SV displays also show other cultural (manmade) features and computer-generated flight symbology overlaid on the SV imagery.

NASA Langley Research Center/Jeff Caplan

"Awesome" and "way cool" were some of the words used by pilots who flight tested SV systems on board a 757 aircraft based at NASA's Langley Research Center in Hampton, VA. Seven pilots from the airlines, Boeing, the FAA, and NASA flew more than 100 approaches using SV displays in 2001.

In an SV system, a static SV database is synchronized with global positioning system (GPS) which provides continually updated data about the aircraft's state (heading, airspeed, attitude) and position.

Right now GPS is the driver, but other high-precision navigation solutions could do the same, and might be used in the future.

Defining "SV"

Part of developing a technology is defining exactly what it is and what it will do. SV technology and its applications are still in early stages of development, refinement, and certification, so its definition might change over time. However, after much deliberation among the aviation community, the FAA has arrived at its current definition of synthetic vision:

> [A] computer-generated image of the external scene topography from the perspective of the flight deck that is derived from aircraft attitude, high-precision navigation solution, and database of terrain, obstacles and relevant cultural features.

Integrated SV-PFD systems

SV systems can either be displayed on the primary flight display (PFD) — the aircraft instrument dedicated to flight information — or presented on another display off to the side.

In an integrated system, the SV imagery shows perspective terrain, and sometimes obstacles and other relevant cultural features, that replaces the conventional blue and brown background of the attitude indicator. This background is important because the pilot intuitively assigns the graphics as up vs. down (sky vs. earth).

Terrain database

Essential to any SV product is the integrity of its database. Outdated, inaccurate, or low-resolution data could mislead the pilot and possibly introduce a false sense of security. An SV system can use the same type of database as that used for a terrain awareness and warning system (TAWS). For more about TAWS for transport category airplanes, see Advisory Circular 25-23.

Product variability

The pilot's ability to interpret the virtual scene on the SV display depends on how the terrain and other features such as bodies of water, obstacles, and cultural features are represented. The SV graphics displays vary across SV products, depending on the manufacturer's rendering of the terrain, bodies of water, and other features. Some products use unique colors,

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shading, and texturing, which research suggests can enhance the pilot's distance perception and provide some important elevation cues about the terrain ahead.

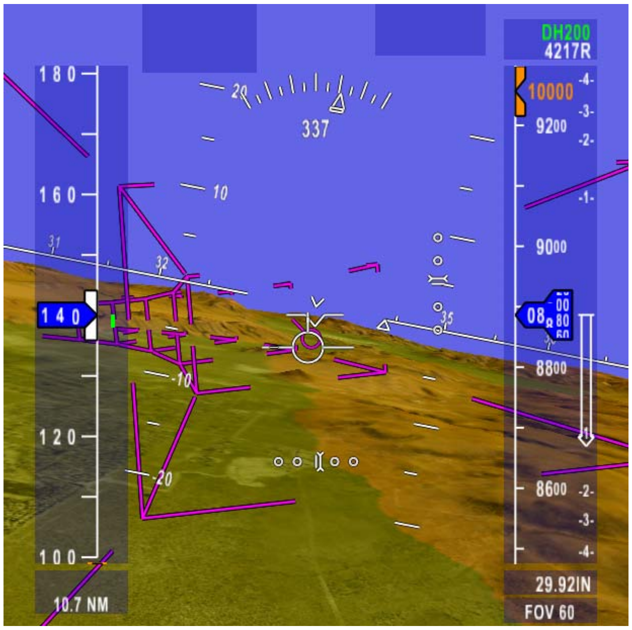
SV Benefits

Proponents of SV systems often name "situation awareness" as SV's greatest benefit to the pilot. Situation awareness refers to how well the pilot understands situation-specific factors (location, system states, and weather, for example) that affect the ability to pilot the airplane.

SV might eventually prove useful in efforts toward improving aspects of situation awareness such as terrain awareness and avoidance by providing a virtual world to assist the pilot during low-visibility conditions, especially during critical phases of flight such as instrument approaches and landings.

The aviation community generally agrees that SV has the potential to improve safety. For example, an SV system can allow the pilot to cross-check the position of the runway during approach. For general aviation, using SV might even reduce accidents, as, for example, when a pilot who is flying using visual flight rules suddenly gets caught in low visibility conditions that require an immediate transition to instrument flight rules.

SV's potential for improving safety is supported by research in several aspects: improving situation awareness, reducing pilot workload, reducing flight technical errors, simplifying instrument flying (especially with an integrated SV-PFD system), and reducing accidents caused by CFIT (controlled flight into terrain) and low-visibility conditions.



NASA Langley Research Center computer screen shot

Synthetic Vision includes a computerized terrain atlas that shows the pilot what's outside no matter the weather or time of day. This is a snapshot of the area outside Reno, where NASA flight tested the flight deck technology on board a Gulfstream V in 2004.

SV's greatest value might be the pilot's perception of the location, heading, and altitude of the aircraft *relative to the terrain*. SV systems can't provide a precise one-to-one match between the real world and the SV graphic, but SV users can rely on cues that show, for instance, that one feature is in front of another.

Enhanced Flight Vision Systems

Enhanced Flight Vision Systems (EFVS) provide the pilot with a display of the scene outside the airplane through the use of imaging sensors. In contrast to SV, an EFVS provides real-time information to the pilot.

The two technologies have been in competition of sorts to determine which will better address requirements associated with landing in low-visibility conditions. SV proponents tout SV's realistic display, unaffected by weather; EFVS proponents claim that EFVS is "real" vision in real time — not just a static database.

SV + EFVS = The future?

The future of electronic flight displays might actually result from the fusion of SV with EFVS. Integrating the imaging sensor data from an EFVS system might compensate for the limitations of the terrain database—if the EFVS system can detect discrepancies between the SV database and the real environment. Mixing the real-time, real-world information of an EFVS system with the database of an SV system might someday help pilots "see" through the fog — and achieve equivalent visual operations.

What is Enhanced Flight Visibility?

Enhanced flight visibility (EFV) is an electronic means to provide a display of the forward external scene topography (the natural or man-made features of a place or region especially in a way to show their relative positions and elevation) through the use of imaging sensors, such as a forward-looking infrared, millimeter wave radiometry, millimeter wave radar, or low light level image intensifying. (14 CFR 1.1, "General Definitions").

Continuing efforts

Certain groups within the FAA and industry continue to devote significant time and effort toward the development and review of SV products.

For example, RTCA, Inc., a

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NASA Langley Research Center/Jeff Caplan

Using a Synthetic Vision System that combines GPS satellite signal with a computerized terrain database and advanced sensors, pilots would be able to "see" terrain and obstacles in front of them even if it's dark or foggy.

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private nonprofit corporation, provides recommendations to the FAA on communications, navigation, surveillance, and air traffic management. Its recommendations are often used by the FAA as the basis for policy, program, and regulatory decisions and by the private sector as the basis for development, investment and other business decisions. Specialists from government and industry explore the operational and technical ramifications of different technologies in their recommendations for minimum operational performance specifications (MOPS) and minimum aviation system performance specifications (MASPS).

RTCA Special Committee (SC) 213 was chartered to develop MASPS for EFVS and SV systems by the end of 2008. SC 213's first public meeting (February 2007) was well attended by many parts of industry and regulatory agencies. Key topics included mapping current regulations, and reviewing NASA's and MITRE Corporation's research on SV and EFVS operational considerations.

Within SC 213, two working groups were established. Working Group 1 will develop MASPS for SV (no operational credit) for terrain awareness, obstacles, traffic, airport and airspace awareness. Working Group 2 will develop MASPS for EFVS using 14 CFR 91.175 ("Takeoff and landing under IFR"), and MASPS to explore potential uses of EFVS/SV down to zero visibility and zero landing.

The second and third SC 213 public meetings were also very productive and well attended. The committee met in working groups to standardize definitions and develop a draft MASPS.

NextGen

"Focus on the Future," a recent New Technologies Workshop sponsored by the FAA's Flight Technologies and Procedures Division (AFS-400), featured SV and EFVS as two relatively new technologies with potential benefit in a performance-based national airspace system (NAS). The challenge will be to integrate these technologies in a timely manner as the FAA moves toward the Next Generation Air Transportation System (NextGen). NextGen was enacted in 2003 by President Bush and Congress under VISION 100 – Century of Aviation Reauthorization Act (P.L. 108 176). [Ed. Note: Large PDF.] In this initiative, the Joint Planning and Development Office is responsible for managing a public/private partnership to bring NextGen online by 2025. NextGen's computerized air transportation network stresses adaptability by enabling aircraft to immediately adjust to ever-changing factors such as weather, traffic congestion, aircraft position via GPS, flight trajectory patterns, and security. By 2025, all aircraft and airports in U.S. airspace will be connected to the NextGen network and will continually share information in real time to improve efficiency and safety and absorb the predicted increase in air traffic.

In the next issue, we will discuss some of the challenges faced by the FAA and industry when certifying SV products. We'll also present some of the limitations of SV systems (what SV can't do), and describe ongoing rulemaking efforts related to SV.

For more information about synthetic vision, contact:

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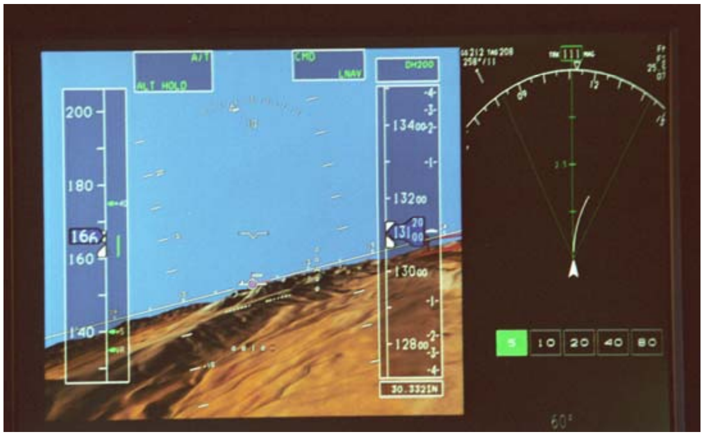
Something to note…

The National Transportation Safety Board (NTSB) issued a safety alert titled "Controlled Flight Into Terrain in Visual Conditions: Nighttime Visual Flight Operations are Resulting in Avoidable Accidents." Synthetic Vision has the potential to help reduce the type of accident described in the safety alert.



NASA Langley Research Center/Jeff Caplan

Pilots tested various Synthetic Vision display concepts developed by the NASA Aviation Safety Program in a real-life, terrain-challenged environment. During flight tests near mountainous Vail, CO, they evaluated display sizes, fields of view and computer graphic options to help determine which configurations will be most effective in preventing accidents. The system includes visual cues that will give pilots precision navigation guidance and help them avoid obstacles.

Class B Cargo Compartments

Safety requirements for cargo can present challenges

Before every flight, airline operators sort all baggage and cargo into compartments approved as class A, B, C, or E. The operator's primary concern revolves around how the cargo affects safety, especially as it relates to fire hazards and fire control.

Safety requirements for Class B cargo present many challenges to owners and operators of transport category airplanes.

The Evolution of Class B Cargo Compartments

When transport category airplanes were smaller and flew relatively short distances, Class B compartments were typically located on the passenger deck for luggage and were usually less than 200 cubic feet in volume. As airplanes grew larger, so did the average Class B compartment size and the variety of functions the compartments serve.

Class B compartments should not be confused with the overhead bins and closets where passengers stow their carry-ons; Class B cargo compartments are accessible only to crew and are for carriage of cargo (including baggage, packages, etc.). They must be configured in a way to ensure that a crewmember can reach and contain a fire with a hand-held fire extinguisher.

Most of today's Class B compartments no longer fit the original small luggage compartment example. In fact, it's hard to define a "typical" Class B compartment these days, which can be a source of confusion.

However, owners and operators have been innovative in applying Class B requirements to meet their transportation needs. For example, pallets wrapped in fire-resistant material with ports to insert a fire extinguisher's nozzle can be considered Class B cargo.

Today, Class B compartments range in size from about 50 cubic feet up to 17,000 cubic feet. Their function ranges from 1) baggage and cargo compartments on small commuter airplanes to 2) individually wrapped pallets on airplanes that serve Alaska's remote communities to 3) flexible cargo space installed on the main decks of large passenger/cargo combination ("combi") airplanes.

Class B Cargo Fire, Lessons Learned

When testing fire suppression systems for cargo compartments, the FAA uses a combination of helium and theatrical smoke to produce a plume with buoyancy properties similar to the plume from a small fire. Generating smoke for as little as fifteen seconds with this smoke generator caused smoke detectors to alarm in less than one minute for all the locations tested.

Current Class B regulations require that a crewmember be able to access all cargo with a hand-held fire extinguisher; however, there are no restrictions on compartment size. While handhelds are effective, they can be depleted quickly when fighting a smoldering or intense fire — especially in a larger-sized Class B compartment.

An accident on November 27, 1987, highlighted how important it is to consider the compartment size and the firefighting ability of a typical crewmember, when designing, certifying, or doing safety analysis of cargo compartments.

In that accident, a South African Airways Boeing 747-200 Combi "B" airplane, Flight 295, crashed into the

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Indian Ocean after reporting a fire on board. The South African Board of Inquiry could not determine an official cause, but noted that the fire started in the main deck's Class B cargo compartment, and could not be controlled.

Although there was not enough evidence or information to determine positively how the uncontrolled fire started on the South African Airways jet, it seems that the large space and an insufficient amount of fire-extinguishing agent available were factors in fire control. Another factor was that a crewmember had to enter the compartment to fight the fire — a difficult and dangerous task.

As a result, the FAA issued AD 93-07-15, amendment 39-8547, to require operators of certain Boeing and McDonnell Douglas airplanes to incorporate systems and equipment to minimize the hazards associated with a fire in a Class B compartment on the main deck. The AD requires improvements in fire/smoke detection, firefighting, fire containment, and communication; converting the compartment into a Class C compartment; or, for main deck compartments, permitting only cargo in flame-penetration resistant cargo containers to be loaded.

At the time AD 93-07-15 was issued, there were not as many large combi airplane models as there are now. However, the AD affected later large Class B combi airplanes in that operators of these airplanes must either 1) carry sufficient fire extinguishing agent, or 2) restrict the size of the Class B cargo compartment by various means (e.g., the use of fire containment covers).

The Cargo Standard Harmonization Working Group (CSHWG), established by the Aviation Rulemaking Advisory Committee (ARAC), developed recommendations to address safety concerns about some types of Class B cargo compartments. Ground tests conducted by the FAA's Technical Center Fire Safety Branch found that crewmembers would be extremely reluctant to enter a compartment to fight a fire.

The size of the compartment also affected the firefighting efforts. The CSHWG recommended revising 14 CFR 25.855 ("Cargo or baggage compartments") and 14 CFR 25.857 ("Cargo compartment classification") to change Class B standards and establish standards for a new class of cargo compartments — Class F. The Transport Airplane Directorate has a rulemaking action in work to adopt these recommendations .

The FAA has conducted extensive tests of fire-resistant cargo covers. This photo shows a partially loaded pallet before the test cover was fully lowered.

Quick Guide to Current Cargo Compartment Categories

Refer to 14 CFR 25.857 ("Cargo compartment classification") for specific wording. You can find a copy of the regulation online at http://rgl.faa.gov.

Class A: Usually small and typically a compartment to store crew luggage in the cockpit. Any fire must be easily discovered by a crewmember when they are at their station. The compartment must be easily accessible by crewmembers during flight.

Class B: Usually installed on the main/passenger deck. A smoke or fire detection system is used to warn flightcrew of a fire. The amount of escaping smoke, flames, and extinguishing agent must be controlled whenever the compartment is accessed. A crewmember must be able to reach any part of the compartment with the contents of a hand-held fire-fighting device.

Class C: Not as accessible to crewmembers as Class B or A (if at all), these compartments are usually found below the passenger deck. In addition to the smoke or fire detecting system, a built-in fire fighting or suppression system controllable by the flightcrew is also required.

Class E: Allowed only on all-cargo airplanes. Control of airflow is used in suppressing fire. Fire or smoke detection system required.

From Class B to Class F

ARAC proposed that the FAA develop a new cargo category called Class F. If a new Class F category is adopted, based on these recommendations, Class B and Class F might look something like the following.

Revised Class B. The possible revisions to Class B could specify a slightly different standard of "adequate" crewmember access that would indirectly result in a maximum compartment size restriction of 200 cubic feet (based on the typical configurations seen today) — in effect "shrinking" Class B to the originally intended volume. Hand-held firefighting equipment could

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still be used, and all areas of the compartment would still be required to be accessible to a crewmember. If Class B is revised as recommended, the compartment would be configured in such a way that crewmembers would not be required to enter the compartment to fight a fire.

New Class F. The new Class F cargo compartments, if adopted as the CSHWG recommends, would not have the same size restrictions as the modified Class B standards. The larger Class B compartments, especially those affected by AD 93-07-15, would be ideal candidates for conversion to the proposed Class F category. Modifying Class B compartments to Class C requirements (an option in AD 93-07-15) would still be an option. New compartments that might be currently considered as large Class B compartments could fit into Class F standards. The firefighting requirements would be more flexible, allowing for several options (including but not limited to modification, and fire-resistant covers and barriers) to allow for unique configurations that might be necessary to serve remote areas in Alaska. Some of the firefighting system configurations specified in AD 93-07-15 could be used in Class F configurations.

If these recommendations are adopted, the FAA will also consider developing an Advisory Circular to assist in efforts to apply these standards consistently.

A Brief Look at a Fire in a Class E Cargo Compartment

On February 7, 2006, a McDonnell Douglas Model DC-8 freighter landed at Philadelphia (PHL) with a cargo fire on board. The NTSB has issued a preliminary report and held a public hearing July 12-13, 2006. Readers can go on-line to visit the NTSB web site for further details and the final report (when it is released).

While any fire on board a cargo airplane is of interest to those who are in the aviation industry, this accident is of particular interest to people who are involved with Class E compartments. A summary of some of the available information is below.

Pilots/crewmembers: All three survived with minor injuries.

Cargo: Roughly 60 percent of the total cargo was damaged or destroyed. Approximately 80 percent of the ULDs (unit load devices) were damaged or destroyed.

Airplane: The airframe was destroyed. Fire caused the crown of the fuselage to collapse in two places.

Items of interest found during the investigation: All elements of Class E compartment requirements in the airplane's compartment design helped pilots to land and survive the fire.

During the early stages, the ULDs seemed to be effective in containing the fire to a limited area, though the fire spread in later phases. In addition, the ULDs on the airplane restricted the flow of air and flames.

Photos courtesy of the National Transportation Safety Board.

The photos at left show the aftermath of a Class E cargo compartment fire. The crew of the DC-8 reported a cargo smoke indication. The three flightcrew members received minor injuries, and the subsequent fire on the ground caused substantial damage to the airplane and numerous cargo containers on board.

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Overview of FAA Regulatory and Guidance Material

This is a quick summary of the statutes that govern the FAA as a regulatory agency, our regulations, and other documents we issue that affect entities that the FAA regulates.

Title 49 U.S. Code — Transportation. Title 49 regulates transportation in the U.S. Subtitle 1— Department of Transportation governs the FAA's activities. It gives the general requirements for the FAA Administrator to promote safe flight.

Code of Federal Regulations. The code of federal regulations (CFR) is an annual publication that compiles all final regulations issued by executive departments and federal agencies. The CFR contains Presidential executive orders and regulations based on those orders, federal laws, and other federal regulations. It is divided into fifty volumes, known as titles. Related matters are grouped together under each title.

Each volume of the CFR is updated once each calendar year and is issued on a quarterly basis.

Title 14 of the CFR (14 CFR) is "Aeronautics and Space." Chapter 1 of Title 14 contains Federal Aviation Regulations (FARs). The FARs that relate to aviation are numbered Part 1 through Part 199, and relate to topics ranging from airworthiness standards for transport category airplanes to aviation insurance. Some FARs that are of interest to commercial airplane operators and manufacturers are listed in the box below.

Airworthiness Directives (ADs). The FAA issues an AD to correct an unsafe condition on a product or component, and when that unsafe condition is likely to exist or develop on other products of the same type design.

ADs tell owners, operators, and maintenance personnel the actions needed to correct the unsafe condition. These actions can include inspections, repairs, and design changes, or possibly limitations under which the airplane can continue to operate. An AD always contains a compliance time for the required actions.

ADs are incorporated into FAR 39 (14 CFR Part 39). For more about current ADs, see the Regulatory and Guidance Library.

Orders and Notices. Orders and Notices give policy, instructions, and work information to FAA employees and designees. They spell out how the FAA expects to carry out its responsibilities.

Orders are permanent, and remain in effect until specifically cancelled. Notices are temporary instructions or announcements, and remain in effect for 12 months or less.

Orders and notices are posted in the Regulatory and Guidance Library.

Advisory Circulars (ACs). The FAA uses ACs to give the public information that is of interest, but is non-regulatory. An AC might provide guidance and information in a specific subject area, or show an acceptable method for complying with a specific FAR. No AC is binding on the public or the FAA. For a list of current ACs, see the Regulatory and Guidance Library.

Some Relevant Federal Aviation Regulations (14 CFR)

Part 1:	Definitions and Abbreviations.	Part 43:	Maintenance, Preventive Maintenance, Rebuilding and Alteration.
Part 11:	General Rulemaking Procedures.	Part 45:	Identification and Registration Marking.
Part 15:	Administrative Claims Under Federal Tort Claims Act.	Part 91:	General Operating and Flight Rules.
Part 21:	Certification Procedures for Products and Parts.	Part 121:	Operating Requirements: Domestic, Flag, and Supplemental Operations.
Part 25:	Airworthiness Standards: Transport Category Airplanes.	Part 125:	Certification and Operations: Airplanes Having a Seating Capacity of 20 or More Passengers or a Maximum Payload Capacity of 6,000 Pounds or More; and Rules Governing Persons on Board Such Aircraft.
Part 26:	Continued Airworthiness and Safety Improvements for Transport Category Airplanes.	Part 129:	Operations: Foreign Air Carriers and Foreign Operators of U.S.-Registered Aircraft Engaged in Common Carriage.
Part 33:	Airworthiness Standards: Aircraft Engines.	Part 145:	Repair Stations.
Part 36:	Noise Standards: Aircraft Type and Airworthiness Certification.	Part 135:	Operating Requirements: Commuter and on-Demand Operations and Rules Governing Persons on Board Such Aircraft.
Part 39:	Airworthiness Directives.	Part 183:	Representatives of the Administrator.

Transport Airplane Directorate (TAD) Regulatory Radar

Current Rulemaking

The following rulemaking actions have been published in the *Federal Register* since the last issue of the *Transport Certification Update*. For full text of these and other actions see: regulations.gov.

Final Rules:

Enhanced Airworthiness Program for Airplane Systems/Fuel Tank Safety. Docket No. FAA-2004-18379; Final Rule (FR) issued 10/22/07. Amendment Nos. 1–60, 21–90, 25–123, 26–0, 91–297, 121–336, 125–53, 129–43.

This final rule improves the design, installation, and maintenance of airplane electrical wiring systems and aligns those requirements as closely as possible with the requirements for fuel tank system safety. It requires holders of type certificates for certain transport category airplanes to conduct analyses of their airplanes and make necessary changes to existing Instructions for Continued Airworthiness (ICA) to improve maintenance procedures for wire systems. It requires operators to incorporate ICA for wiring into their maintenance or inspection programs. It also clarifies requirements of certain existing rules for certain operators to incorporate ICA for fuel tank systems into their maintenance or inspection programs.

Damage Tolerance Data for Repairs and Alterations. Docket No. FAA-2005-21693; FR issued 12/7/07. Amendment Nos. 26-1, 121-337, 129-44.

This final rule requires holders of design approvals to make available to operators damage tolerance data for repairs and alterations to fatigue critical airplane structure. This rule will support operator compliance with the Aging Airplane Safety final rule with respect to the requirement to incorporate into the maintenance program a means for addressing the adverse effects repairs and alterations may have on fatigue-critical structure. The intent of this rule is to ensure the continued airworthiness of fatigue critical airplane structure by requiring design approval holders to support operator compliance with specified damage tolerance requirements. This is related to part 25 but only amends parts 26, 121, and 129.

Advisory Circulars (ACs) and Policy.

The following projects related to ACs and Policies are currently underway in the TAD. For full text see: http://rgl.faa.gov.

Part 25 Final Advisory Circulars (AC) issued:

The following ACs were issued between 10/22/07 and 12/4/07 to support the new Enhanced Airworthiness Program for Airplane Systems/Fuel Tank Safety rule discussed previously:

- AC 25.869-1A, Fire Protection: Systems
- AC 25.899-1, Electrical Bonding and Protection Against Static Electricity
- AC 25.1353-1A, Electrical Equipment and Installations
- AC 25.1357-1A, Circuit Protective Devices
- AC 25.1360-1, Protection Against Injury
- AC 25.1362-1, Electrical Supplies for Emergency Conditions
- AC 25-26, Development of Standard Wiring Practices Document
- AC 25-27, Development of Transport Category Airplane Electrical Wiring Interconnection Systems Instructions for Continued Airworthiness Procedure
- AC 25.1365-1 Electrical Appliances, Motors, and Transformers
- AC 25.1701-1, Certification of Electrical Wiring Interconnection Systems on Transport Category Airplanes

The following ACs were also issued between 10/22/07 and 12/4/07:

- AC 25.1529-1A, Instructions for Continued Airworthiness of Structural Repairs on Transport Airplanes. We revised purpose and applicability sections of the AC.
- AC 26-1, Part 26 Continued Airworthiness and Safety Improvements. This AC describes an acceptable method of compliance with certain requirements of 14 CFR part 26 and how the results of that compliance relate to certain complementary operational rules. The standards in 14 CFR part 26 may require performing assessments,

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developing design changes, and revising instructions for continued airworthiness for transport category airplanes. This AC provides generic guidance that is applicable to the safety initiatives in 14 CFR part 26 that may be issued. This AC provides generic guidance on the roles and responsibilities of type certificate and supplemental type certificate holders, manufacturers, owners, and operators. This AC also provides guidance on the processes for developing compliance plans, data, and information that would be available to operators to meet the safety objectives.

Part 25 Final Policies issued:

Certification and Continued Airworthiness of Unbalanced and Mass-Balanced Control Surfaces.

ANM-05-115-019, issued 11/16/07. This policy memorandum clarifies FAA policy for the design, certification, and continued airworthiness of control surfaces that rely on retention of restraint stiffness for flutter prevention (i.e., unbalanced or partially balanced control surfaces). These control surfaces typically do not have added mass balance; however, this policy would apply to some control surfaces that are partially mass balanced. This policy also addresses the maintenance actions necessary to ensure that mass-balanced control surfaces remain within their balance limits while in service. The guidance in this memorandum does not apply to devices used strictly for high lift, for example, leading and trailing edge flaps. However, if a high-lift device is also used for flight control, for example, a “flaperon,” this guidance would apply. Specifically, this memorandum provides acceptable means of establishing and certifying freeplay limits and inspection procedures guidance for managing freeplay and mass-balance limits over the airplane service life. It also provides a means of compliance for control system designs whose failure can result in a nonlinear aeroelastic configuration and limit cycle oscillation.

Unreliable Design of Seat Belt Attachment Fittings on Passengers’ Seats.

PS-ANM-04-115-28, issued 11/23/07. This policy states that the FAA will no longer approve installations of “D-ring” seat belt attachment fittings. In addition to this policy memo, the FAA issued a Special Airworthiness Information Bulletin (SAIB) recommending that the D-ring seat belt attachment fittings be replaced with fittings of an improved design.

Part 25 Draft AC issued:

AC 25.1535-1X, Certification of Transport Category Airplanes for Extended Operations (ETOPS).

The public comment period closed on 3/4/08. This AC provides guidance for certifying an airplane-engine combination for extended operations (ETOPS) under 14 CFR 25.1535 and Appendix K to part 25. This AC also provides guidance for ETOPS reporting requirements under 14 CFR 21.4.

Part 25 Draft Policy issued:

Fire Extinguisher Size, Quantity, and Location for Class B Cargo/Baggage Compartments No Greater than 200 Cubic Feet.

The public comment period closed on 11/9/07. This policy memorandum clarifies FAA certification policy for the numbers and sizes of Halon 1211 fire extinguishers (or equivalent) necessary to protect against a fire in small Class B cargo/baggage compartments. These compartments are typically in “executive business” transport category airplanes. Specifically, this policy addresses the need for at least one hand-held fire extinguisher in the pilot compartment, in each Class B cargo/baggage compartment, and in the passenger compartment for airplanes with seven or more passengers, as a means of complying with 14 CFR 25.851.

On the Cover

The beauty of the photo on our cover conceals a hazard to transport category airplanes: wake vortex

Photo courtesy of airliners.net, © 2006 (Steve Morris, AirTeamImages)

Boeing Model 777-200, London - Gatwick. The photographer says: "Descending through thin layer of cloud five miles from landing. This is actually a full 'color' image, the shades of grey is the way it was."

It is important to understand the effects of wake vortex on transport category airplanes. The larger the airplane, the more vortex it produces, and the greater effect that vortex has on other airplanes in flight. Consideration of wake vortex affects not only air traffic, separation distances, and airport capacity, but also many design and certification decisions. NASA has done and continues to do research into wake vortex, and works with the FAA and industry to establish safe separation distances between aircraft. For more information see the NASA fact sheet on wake vortex research.

Wake Vortex Study at Wallops Island, Virginia, May 4, 1990

The air flow from the wing of this agricultural plane is made by a technique that uses colored smoke rising from the ground. The swirl at the wingtip traces the aircraft's wake vortex, which exerts a powerful influence on the flow field behind the plane. Because of wake vortex, the FAA requires aircraft to maintain set distances behind each other when they land. A joint NASA-FAA program for boosting airport capacity, however, is aimed at determining conditions under which planes may fly closer together. NASA researchers are studying wake vortex with a variety of tools, from supercomputers to wind tunnels to flight tests in research aircraft. Their goal is to fully understand the phenomenon, then use that knowledge to create an automated system that could predict changing wake vortex conditions at airports. Pilots already know, for example, that they have to worry less about wake vortex in rough weather because windy conditions cause them to dissipate more rapidly.

Photo and text courtesy of NASA Langley Research Center.

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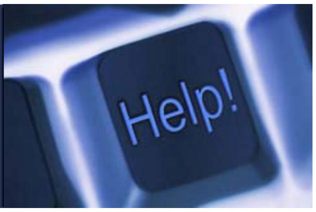
Featured Web Site: Aircraft Certification Service (AIR)



AIR maintains a web site on the Internet at http://www.faa.gov/aircraft/air_cert/ that contains information to help with aircraft registration, airworthiness certification, continued operational safety, design approvals, international aircraft certification, and production approvals.

The web site also gives the location of certification offices, including Aircraft Certification Offices (ACOs), Flight Standards District Offices (FSDOs), Manufacturing and Inspection District Offices (MIDOs), and Manufacturing Inspection Offices (MIOs). The offices provide direct personal assistance with a variety of issues such as design approvals, production approvals, engineering analysis, authorized representative oversight, airman certification, and airworthiness certification.

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