



# The View from Washington

BY ERIC PERI  
VICE PRESIDENT, AEA GOVERNMENT & INDUSTRY AFFAIRS

## Back to Basics: Major or Minor Alterations

**D**espite two years of training and distributing thousands of the AEA's "Architecture of an Alteration" training CDs, we still are plagued by discussions of alterations. And, despite the regulations and relatively clear guidance out there for determining "major" and "minor," we still seem to have disagreements with the regulators on the topic.

The most recent disagreement is a fairly common argument: Occasionally, an inspector will argue that the alteration isn't listed in the aircraft specifications; therefore, it must be "major." Wrong.

The origins of this argument are the 14 CFR Part 1 definitions. Part 1 states: "Major alteration means an alteration not listed in the aircraft, aircraft engine or propeller specifications, (1) that might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness, or (2) that is not done according to accepted practices or cannot be done by elementary operations."

The inspector who considers any alteration as major typically will interpret the Part 1 definition of a "major" alteration as an alteration that:

- is not listed in the aircraft, aircraft engine, or propeller specifications; or,
- might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
- is not done according to accepted practices or cannot be done by elementary operations.

However, this is not the plain-English reading of the Part 1 definition. Based on the plain-English reading, the definition of a major alteration "exempts" any alteration listed in the aircraft specification.

For any alteration not listed in the specifications, measure the appreciable affect of the alteration on the type-certificated product, then add the new and unique practices caveat. This actually makes good sense. Any alteration listed in the aircraft specification sheet would have been:

- Reviewed by the manufacturer.
- Demonstrated to comply with the applicable regulations.
- Reviewed and approved by the FAA.

So, it makes sense that any alteration listed in the aircraft specifications would be considered a minor alteration.

While the regulation isn't clear on this point, I generally consider the use of the manufacturer's alteration data to be a key element for alterations listed in the specifications.

The other area still garnering quite some discussion regards alterations that "might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness."

The first question is, "What is appreciable?" Webster defines "appreciable" as "capable of being perceived or measured."

While this seems pretty strong and damaging language in the debate between major and minor, it really isn't. This is speaking of the effect of the alteration on

the type-certificated product. In other words, when the alteration is completed and the aircraft is returned to service, could the alteration just completed have had a "measurable" effect on these six critical areas: weight and balance; structural strength; performance; powerplant operation; flight characteristics; or other qualities affecting airworthiness? If so, the alteration is major.

Why these six categories? Because any measurable change in the certificated levels of each category might affect the ability of the aircraft to fly safely and needs to be reviewed by an engineer. In most cases, it's simply having a second set of eyes reviewing the proposed alteration. However, because the effect of missing something is so great, the alteration requires "approved data."

These six categories can be broadly interpreted. So, what is the intent of each characteristic?

In 2002, the FAA published Order 8110.46: Major Alterations that Require Supplemental Type Certificates. In this order, the FAA gave the best explanation of these six critical categories of change.

Before you make the argument that the order applies to STC and not major alterations, 14 CFR 21.93 (a) defines a "minor change" in type design as one with no appreciable effect on the weight, balance, structural strength, reliability, operational characteristics, or other characteristics affecting the airworthiness of the product. Notice that five of the six characteristics are the same, while a major alteration looks at "flight characteristic" and 21.93 focuses

on “operational characteristics.” Both deal with the ability of the aircraft to fly, not operational “credit” of the installation.

While this order was rescinded, the definition from Order 8110.46 provides the best description of these characteristics. Order 8110.46 was rescinded following the 2002 publication of CHG 15 to FAA Order 8300.10, which provided guidance to the FAA workforce on performing field approvals of major repair and major alterations. The reason was that the logic of 8110.46 was incorporated into Change 15. Unfortunately, words were lost in the process. For this discussion, the original words are important.

What were these words? For general aviation aircraft with a certification basis of 14 CFR Parts 23 and 31, or Joint Aviation Regulation (JAR) 22, FAA Order 8110.46 described typical alterations that may appreciably affect these six characteristics:

### **Weight and Balance**

- Changes that increase the certificated maximum weight limits (increases in the maximum gross weight, maximum take-off weight or landing weight), or changes in the certificated center of gravity range limits (for example, decreasing the forward limit or increasing the aft limit).

### **Structural Strength**

- Alterations that include changes to primary structures (a structure that carries flight, ground or pressure loads as defined in AC 25.571-1, Damage Tolerance and Fatigue Evaluation of Structure), or substituting an engine, propeller, rotor or airframe primary structural materials (such as replacing a reciprocating engine with a turbine engine, or increasing horsepower output by 10 percent or more).

### **Reliability**

- Alterations that make changes to

manifolding, air induction systems or air intake doors; engine cowling or baffle that affect the flow of engine cooling air and carburetor/fire ignition heat rises; changes to the basic engine or propeller design, controls and operating limitations; or changes that include engine/propeller adjustments and settings limitations that affect power output.

- Modifications to approved avionics equipment that affect reliability or airworthiness, such as changes that deviate from the design environment performance, deviate from the component manufacturer’s operating limitations, or changes to software; and any change to wire shielding that may affect high intensity radiated fields and electromagnetic interference.

### **Operational Characteristics**

- Changes or relocation of systems (including hydraulic, oil and fuel systems) and equipment that affect structural integrity, flight, ground handling characteristics, or noise/acoustics of the aircraft.

- Changes that alter the movable control surfaces that affect the dynamic and/or static balance, alter the aerodynamic contour of moveable control surfaces, or change the weight distribution.

- Changes in control surface travel, control system mechanical advantage, location of control system component parts, or direction of motion.

- Changes in basic dimensions or external aerodynamic contour/configuration of the aircraft, such as wing and tail planform or incidence angles, canopy, cowlings, contour or radii; the location of wing and tail fairings, winglets, wing lift struts, tiptanks, windows and doors.

- Installation of structure and/or appliances to the exterior (such as night sun beacon, camera, spray/dusting equipment) on rotorcraft only.

- Changes to flight-critical electrical/electronics systems, such as electronic

flight controls or the engine control system, full authority digital engine control, fly by wire, and so forth.

- Changes that affect aircraft performance, drag, engine power, revolutions per minute, or exhaust muffler.

- Changes affecting noise or flight characteristics.

- Rotorcraft items, such as external searchlights, skis, baskets, and so forth.

### **Airworthiness**

- Changes to landing gear and related components, such as internal parts of shock struts, length, geometry of members; changes to brake and brake systems, or additions.

- Changes to systems that affect aircraft airworthiness, such as relocation of exterior fuel vents or battery vents; crew or passenger liquid oxygen or onboard generating systems; external critical access doors; auxiliary power unit (APU) ram air; nacelle blowout doors; or fuel drain.

- Major deviations to STCs.

- Changes to oil, hydraulic, pneumatic and fuel lines or systems that affect their operation or installation and flammability requirements, such as new types of hoses and/or hose fittings that may not meet installation requirements such as flow rate and flammability requirements; changes to fuel dump valves; new oil/fuel/hydraulic line materials or sealants; change to, or addition of, permanent fuel tanks or fuel system components.

- Changes in fixed fire extinguisher or detector systems that affect system effectiveness or reliability, such as relocation of discharge nozzles, detector units or fixed fire extinguisher bottles; using new or different detector components; decreasing the amount or changing the type of extinguishing agents.

- Changes that include the substitution of engine/APU/propeller/airframe materials that affect structural integrity, lightning protection, flight characteristics

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tics, or noise/acoustics.

• Any other complex special process that, if not properly performed, has a significant adverse effect on the integrity of the product.

- Major alterations to propellers.

### Crashworthiness

The FAA includes crashworthiness in its list of critical characteristics that must be evaluated. Typical alterations that may appreciably affect “crashworthiness” include changes to the aircraft structure, cabin interiors or

equipment relocation; changes that increase the certificated seating capacity, excluding sport parachute jumping configuration; or changes that include the substitution of engine/propeller/airframe materials that affect fire protection, lightning protection or flammability.

### Reviewing an Alteration

If your alteration might have a measurable affect on any of these six characteristics, get your data reviewed and approved. A second set of eyes, a second opinion and an unbiased review of the alteration data is never

a bad idea when the alteration could have a measurable effect on the ability of the aircraft to safely fly.

However, if you evaluate the alteration and can quantitatively define it as a “minor” alteration, do not waste the limited resources of the FAA by requesting “just-in-case” field approvals. The local FAA office has a finite limit of available resources to support field approvals. Industry must take an active role in helping the agency to better manage these necessary resources. □

# Regulatory Update

## United States

### Notice of a Change in Direction Finder Availability in the U.S.

In the June 28, 2006 Federal Register notice, the FAA requested public comments on a proposal to decommission all 54 direction finders (DF) and the associated DF approaches in all states except Alaska.

The FAA argues that DFs have been used sparingly during the past nine years and the equipment is beyond its useful lifecycle. Improved radar coverage, pilot education and technologies such as area navigation (RNAV) and global positioning satellites (GPS) have reduced the utilization of DF steers and essentially have made DFs obsolete.

A Federal Safety Risk Management Panel has determined that if pilots need orientation assistance, existing orientation methods — VOR, ADF and GPS — are reliable and meet the needs of the aviation community.

Decommissioning would coincide with the Flight Services’ service provider’s plan to consolidate the 58 flight service stations to 20 facilities.

Comments were due before July 28,

2006; however, any substantial comments still should be submitted. Send comments (identified by Docket No. FAA-2006-25190) via the Department of Transportation’s docket website at <http://dms.dot.gov>, or fax comments to 202-493-2251. Comments also can be mailed to: DocketManagementFacility; U.S. Department of Transportation, 400 Seventh St., S.W., Nassif Building, Room PL-401, Washington, D.C. 20590-0001.

For more information, contact Jeanne Giering, manager of Flight Services Safety and Operations Support, at 202-385-7627 or [Jeanne.Giering@faa.gov](mailto:Jeanne.Giering@faa.gov).

### Enhanced Airworthiness Program for Airplane Systems/Fuel Tank Safety

On Oct. 6, 2005, the FAA published the “Enhanced Airworthiness Program for Airplane Systems/Fuel Tank Safety (EAPAS/FTS)” proposed rule. This proposal includes a discussion about the FAA’s intent to coordinate the instructions for continued airworthiness (ICA) for fuel-tank systems and electrical wiring interconnection systems (EWIS) to avoid redundancies in those ICA. It also discusses its

intent to align the compliance dates for operators to include those ICA in their maintenance programs.

The purpose of the July 7, 2006 Federal Register notice was to advise industry that while it still intends to avoid redundancies in the fuel-tank system and EWIS ICA, it is no longer practical to align the compliance dates to incorporate those ICA into operator maintenance programs. As a result, the Dec. 16, 2008 compliance date in the fuel-tank safety operational rules remains firm, and industry should proceed with the necessary plans to meet this date.

### Damage Tolerance Data for Repairs and Alterations

On July 7, 2006, the FAA extended the comment period for an NPRM that was published April 21, 2006. In that document, the FAA proposed requirements for holders of design approvals to make available to operators damage tolerance data for repairs and alterations to fatigue critical structure.

This extension is a result of requests from the Air Transport Association of America Inc., Airbus, Boeing Commercial Airplanes, Cargo Airline

Association, and the National Air Carrier Association Inc. to extend the comment period to the proposal.

Comments now must be received by Sept. 18, 2006.

## Canada

### Transport Canada Backs Down on SMS Methods

At the June 22 meeting of CARAC Part V, Transport Canada was faced with unanimous opposition from industry to its proposed methods of implementing safety management systems (SMS) into design organizations for certificate holders, and for design approval representatives.

TCCA backed down and agreed other proposals will be considered. The CARAC WG on the "New Accountability Framework" will meet four times this fall and winter to determine how best to implement TCCA's SMS objectives.

John Carr, AEA's Canadian regulatory consultant, will represent AEA Canada on the WG. Other associations on the WG include AIAC, ATAC, AME Association, VANDARs and AIDAC. In addition, most major DAOs will be represented on the WG. The FAA also will send a representative who is on its CDO working group.

### Transport Canada to Offer Supplemental ICAs Training

Following TCCA's recently re-issued MSI 53 at Revision No. 2, to provide a revised policy for preparation and review of supplemental instructions for continued airworthiness (ICAs), TCCA indicated it would offer training to industry and its staff on the creation and acceptance of supplemental ICAs.

The training will be offered from October 2006 to March 2007, with at least two courses in all TCCA regions. TCCA currently is in discussions with the FAA on reciprocal acceptance of supplemental ICAs for Canadian and

FAA STCs, and TCCA hope the training will be able to reflect agreements reached between TCCA and the FAA.

The AEA will notify Canadian members of the dates of this training.

## Europe

### EASA

- NPA 09-2006 was issued and is of special interest for design organizations. The agency envisages creating a privilege for design organization approval (DOA) holders to issue a permit to fly under certain conditions. Currently under a transition, the responsible NAA issues the permit to fly individually.

The new privilege for the DOA holder would be limited to aircraft for which he has design capability and cannot be used for the first test flights of complete new designs or significantly modified designs. The agency believes it must always remain in the loop for the latter category of test flights in order to ensure safety.

EASA recognizes the DOA privilege should be limited to cases in which delegation of tasks is still justified, taking into account the overall responsibility of the agency and National Authorities for safety and the inherent risk of certain flights under a permit to fly. These limitations can be put in the respective terms of approval using internal guidance, but some also could be put in rule itself.

In any case, the agency intends to distinguish between DOA holders who also hold or have applied for the type certificate for the aircraft concerned, and other DOA holders with regard to the extend of the privileges.

The comment period ends Oct. 11, 2006.

- NPA 08-2006 was issued to evaluate the need for a new deadline to allow some member states more time to adapt their systems to be in line with the provisions of Part 145, which requires that

release certificates for aircraft with a maximum take-off mass of more than 5700kg after base or line maintenance be issued by engineers who comply fully with Part 66. Options would be to keep the regulation as is or to extend the transition period until a deadline to be defined.

- Executive Director Decision 2006/04/R was issued and is amending European Technical Standard Orders (CS-ETSO) adopted by decision 2003/10/RM. Next to others, ETSO-2C112b for Mode S Airborne Equipment was revised.

### JAA

JAA recently issued guidance for a production organization approval (POA) valid for all non-EU JAA applicants for a POA. This procedure provides specific JAA features, in addition to the EASA POA procedures established in accordance with the EASA management board procedures for certification of organizations to implement the principles of Cyprus Arrangements, signed by EASA Nov. 23, 2003.

- JAA informed interested parties it would issue a new amendment to JAR-OPS 1 in August 2006. It will be Amendment 11.

### RTCA/EUROCAE

Two new documents, approved by the program management committee on June 27, now are available from RTCA. DO-260, Change 1 prescribes the changes to DO-260 required for those manufacturers that produce 1090 MHz equipment for broadcast-only that comply only with DO-260. Manufacturers that produce 1090 MHz equipment, which will include the ADS-B receive capability, must comply with DO-260A, Change 1 and the latest available version of FAA TSO C166. □

# Frequently Asked Questions

## TOPIC:

## ATC Transponder Tests and Inspections

*The following information is from the Federal Aviation Administration.*

### QUESTION:

According to FAR 91.411(a)(2), I am required to perform the tests and inspections required by paragraph (a) of 43 appendix E & F. How, as an A&P mechanic, can I change an airspeed in a small single-engine aircraft without having a repair station perform and sign off on 43 appendix F, paragraph (a)?

### ANSWER:

14 CFR 91.411 (a) (2) states that no person may operate an airplane or helicopter in controlled airspace under IFR unless, except for the use of system drain and alternate static pressure valves following any opening and closing of the static pressure system, that system has been tested and inspected and found to comply with paragraph (a), appendices E and F, of part 43 of this chapter.

14 CFR 91.411 (b) defines who may perform the tests required of 91.411 (a), and 14 CFR 91.411 (b) states that the tests required by paragraph (a) of this section must be conducted by any of the following:

- The manufacturer of the airplane or helicopter on which the tests and inspections are to be performed.
- A certificated repair station properly equipped to perform those functions and holding:
  - (i) An instrument rating, Class I;
  - (ii) A limited instrument rating

appropriate to the make and model of appliance to be tested;

(iii) A limited rating appropriate to the test to be performed;

(iv) An airframe rating appropriate to the airplane or helicopter to be tested; or

(v) A limited rating for a manufacturer issued for the appliance in accordance with § 145.101(b)(4) of this chapter.

14 CFR 91.411 (b) (3) allows a certificated mechanic with an airframe rating to perform static pressure system tests and inspections only. Since Part 43 Appendix F is the ATC Transponder Tests and Inspections, an A&P cannot perform this test.

In raising this question with FAA headquarters, the agency acknowledged that Appendix F really has nothing to do with the pitot-static system and that a change to 91.411 is in the works. However, there is currently no exemption to this requirement.

*(Note: The AEA offers "Frequently Asked Questions" to foster greater understanding of the Federal Aviation Administration regulations and the rules governing our industry. The AEA strives to ensure FAQs are as accurate as possible at the time of publication; however, rules change. Therefore, information received from an AEA FAQ should be verified before being relied on. This information is not meant to serve as legal advice. If you have particular legal questions, they should be directed to an attorney. THE AEA DISCLAIMS ANY WARRANTY FOR THE ACCURACY OF THE INFORMATION PROVIDED.)*