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June 1, 2002

U. S. Department of Transportation Dockets  
Docket No. FAA-2001-8994  
400 Seventh Street, SW  
Room 401  
Washington, DC 20509

**Notice of availability and request for comments: Docket No. FAA-2001-8994  
Proposed Advisory Circular (AC) No. 21.101-1 Change 1, Advisory Material for the  
Establishment of the Certification Basis of Changed Aeronautical Products**

The Aircraft Electronics Association (AEA) represents nearly 1100 aviation businesses, including repair stations that specialize in maintenance, repair and installation of avionics and electronic systems in general aviation aircraft. AEA membership also includes instrument facilities, manufacturers of avionics equipment, instrument manufacturers, airframe manufacturers, test equipment manufacturers, major distributors, and educational institutions.

AEA, in general, supports the proposal to amend the AC 21-101: Establishing the Certification Basis of Changed Aeronautical Products. The Association is pleased with the increased clarity regarding the applicability to product level changes. In addition, the participating agencies clearly focused the matrixes on the engineering principle that make a technical change significant rather than the image or size of the change as being an engineering factor.

The Association submits the following general comments to the Advisory Circular followed by specific section by section comments:

As technology advances, especially in the avionics and electronics disciplines, and the industry identifies special conditions that must be met to assure proper and safe operations of this new equipment it is reassuring that the agency agrees that the application of special conditions is not a factor in making a change significant. The association would add that the application of a special condition would not necessarily classify a change as major.

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The Tables of Examples (for each category of airplane) includes multiple references that a new or supplemented approved Flight Manual is necessary. This is misleading and inconsistent and should be removed from each table of examples. It is understood that the technical change to the type certificated product may require a change to a flight manual however the change to the flight manual cannot be allowed to dictate the degree of change to the Type Certificated Product. In addition, while Section 21.93 defines the criteria of a major type design change, the change to the pilot's operating handbook or the flight manual is not one of the six technical criteria of change.

**Section 8, Using the Criteria. Para b.** Each of the automatic criteria would be enhanced by adding examples of each criteria..

To Section 8 Para b. (1) Add:

Examples may include:

- (a) Change from a tricycle landing gear to conventional landing gear.
- (b) Change from a skid mounted landing gear system to a wheeled system.
- (c) Change from a tri-engine configuration to a twin engine configuration.

To Section 8 Para b. (2) Add:

Examples may include:

- (a) Change from a riveted metal skin to a bonded metal skin.
- (b) Change from metal materials to composite materials.
- (c) Change from a semi-monocoque construction to bonded honeycomb structures.

**Appendix 1: Classification of Changes, Para 1. a.** Change the last paragraph to read: The notes column provides typical rationales that are considered in evaluating the designation of the criteria.

Justification: The notes column identifies the typical criteria that would make a change significant or non-significant. However, it is possible for a change that would appear obviously to be a change in general configuration, principles of construction or assumptions for certification that could be defended by the applicant as not in fact compromising the three automatic criteria.

The Association requests that every effort be made to harmonize like examples between Figures 1, 2, and 3 unless there is a technical justification that the classification of change is somehow different based on the certification basis of the type certificated product.

**Table 1: Significant changes, A major flight deck update:** Change the notes column to read: The degree of change is so extensive that it affects basic avionics and electrical systems integration and architecture concepts and philosophies as covered by the certification standards. This drives a complete reassessment of flight crew workload and other human factors issues and requires a reevaluation of the original design assumptions used for the cockpit.

Justification: Harmonizes the note criteria for a “major flight deck upgrade” in both Part 23 and Part 25 aircraft. Also the language assures that the system integration and architecture concepts and philosophies are linked to the certification standards not some arbitrary concept.

**Table 1, Non-significant changes; A general avionics equipment change....:** Change the Description of Product Level Change to read: Avionics equipment installation/change. (Not to include a major flight deck upgrade.)

Justification: Aircraft are either approved for flight into IMC or restricted from IMC operations. IFR certification is addressed previously in the table. A change VFR to IFR certification is not addressed by this listing.

A major flight deck upgrade is addressed elsewhere in the table.

While elements of an Avionics equipment installation may on occasion rise to the level of a major type design change (an antenna installation in a pressurized fuselage) an avionics installation they will NEVER rise to the level of change to cause a significant design change to an aircraft.

The operational opportunities provide by an avionics installation is not considered a deciding criteria of a major type design change as defined by Section 21-93.

While an avionics installation will almost always provide some operational credit to the aircraft operations for having the equipment installed, the credit does not make the change major, cannot make the change significant and short of a major flight deck upgrade will never make the aircraft distinct from another model aircraft.

**Figure 3, Significant changes, VFR to first IFR approval including extensive equipment and redesign:** Separate the technical changes identified in this listing. Add a separate listing for VFR to first IFR approval

Justification: A comprehensive flight deck upgrade is addressed in a separate listing. Including extensive equipment and redesign in this listing is redundant. The concern of this listing should be the addition of IFR certification.

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**Figure 3, Non-significant changes:** Add a listing for: Avionics equipment installation/change. (Not to include a major flight deck upgrade.)

Justification: Rotorcraft are either approved for flight into IMC or restricted from IMC operations. IFR certification is addressed previously in the table. A change VFR to IFR certification is not addressed by this listing.

A major flight deck upgrade is addressed elsewhere in the table.

While elements of an Avionics equipment installation may on occasion rise to the level of a major type design change, an avionics installation they will NEVER rise to the level of change to cause a significant design change to an aircraft.

The operational opportunities provide by an avionics installation is not considered a deciding criteria of a major type design change as defined by Section 21-93.

While an avionics installation will almost always provide some operational credit to the aircraft operations for having the equipment installed, the credit does not make the change major, cannot make the change significant and short of a major flight deck upgrade will never make the aircraft distinct from another model aircraft.

**Figure 1, 2, and 3, Non-significant changes, add:** Instrument equipment installation/change. (Not to include a major flight deck upgrade.)

Justification: A major flight deck upgrade is addressed elsewhere in the table.

While elements of an instrument equipment installation may on occasion rise to the level of a major type design change (changing from a hydro-mechanical indicating system to an electronic indicating system) an instrument installation will NEVER rise to the level of change to cause a significant design change to an aircraft.

**Figure 3, Significant Changes, Emergency Medical Services...:** Change the Description of Product Level Changes to read: Emergency Medical Services Configuration (without primary structural changes sufficient to invalidate the certification assumptions); and move to Non-Significant changes category.

Justification: The notes description clearly indicates that once sufficient structural changes are removed from the description of change the likelihood of an EMS configuration triggering a significant change is remote.

Conclusion:

AEA comments to Docket No. FAA-2001-8994 Proposed Advisory Circular (AC) No. 21.101-1 Change 1, Advisory Material for the Establishment of the Certification Basis of Changed Aeronautical Products

The Aircraft Electronics Association appreciates the opportunity to comment on this proposed rule. Should you have any questions please do not hesitate to contact us at (202) 589-1144.

Sincerely,

Richard A. Peri  
Vice President