



Federal Aviation
Administration

Intended Function

Presented to: SV Workshop

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Date: 16 Feb 06



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Presentation Outline:

- Issue(s)
- Background
- Rules and guidance (two parts)
- SA discussion
- FAA position
- SA Example
- Questions

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Issues:

- **SV on a PFD is new and novel for Transport**
- **Unique combination of conventional and unconventional information elements**
- **FAA needs to understand the implications**
- **FAA believes that SV functionality alters conventional intended functions of the Primary Flight Display (PFD)**

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Issue(s)

Compliance – In order to show compliance with §25.1301(a), this new functionality must have a clear and understandable function that can be evaluated for compliance.

Question – Is there any disagreement with this general statement?

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Status:

- AC 23-26 on SV published 12/22/05
- Industry guidance not yet established
- FAA guidance for Part 25 not established
- SV integrated into Primary Flight Display
- Potential for several intended functions
- Situation Awareness as an intended function (by itself) is not descriptive

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Part 25 Rules and Guidance:

§ 25.1301 Function and installation.

- Each item of installed equipment must
 - (a) Be of a kind and design appropriate to its intended function

§ 25.1309 Equipment, systems, and installations.

- (a) The equipment, systems, and installations whose functioning is required by this subchapter, must be designed to ensure that they perform their intended functions under any foreseeable operating condition.

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Part 25 Rules and Guidance:

AC 25-11 ELECTRONIC DISPLAY SYSTEMS

History:

- The prime airframe manufacturers invested extensive ... work to define ... types of information to be presented, and to prove that these resulting displays would provide an acceptable level of safety.
- The flight test programs gave many hours exposure of the electronic display systems to company test pilots, FAA test pilots, and customer pilots. Certification of the displays came at the end of this process.

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AC 25-11 TRANSPORT CATEGORY AIRPLANE ELECTRONIC DISPLAY SYSTEMS

History:

- Because of this precertification exposure, the FAA had a high degree of confidence that these displays were adequate for their intended function and safe to use in foreseeable normal and failed conditions.

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AC 25-7A- FLIGHT TEST GUIDE FOR CERTIFICATION OF TRANSPORT CATEGORY AIRPLANES

EQUIPMENT FUNCTION AND INSTALLATION

a. Explanation.

(1) Certification of the installation of modern avionics/electrical systems on airplanes can be summarized, generally, by stating that the systems/equipment must:

- (i) Perform its intended function (§ 25.1301)**

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- **AC 25-7A- FLIGHT TEST GUIDE FOR CERTIFICATION OF TRANSPORT CATEGORY AIRPLANES**
- **EQUIPMENT FUNCTION AND INSTALLATION**
- **(3) Section 25.1301 refers to each item of installed equipment.**
 - Where equipment or a system is a part ...of the airplane and is designed to aid and will obviously be used by the crew, the statutorily required tests and findings that must be used necessarily account for that equipment, whether or not it is characterized as "optional."

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- **AC 25-7a- FLIGHT TEST GUIDE FOR CERTIFICATION OF TRANSPORT CATEGORY AIRPLANES**
- **EQUIPMENT FUNCTION AND INSTALLATION**
- **(3) Section 25.1301 refers to each item of installed equipment.**
 - Moreover, the regulatory requirement of § 25.1301(b)(2) specifies that the Administrator must find that no feature or characteristic of the airplane makes it unsafe for the category in which certification is requested.

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- **AC 25-7a**
- **FUNCTIONAL AND RELIABILITY TESTS -§ 21.35(b)(2)**
- **Explanation.**
 - a. In order to satisfactorily accomplish the objectives concerning additional flight tests and the extent thereof, the Administrator deems it necessary that:
 - (1) A comprehensive and systematic check be made, in flight, of the operation of all components to determine whether they "function properly" (i.e., perform their intended function without introducing safety hazards).

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- **Problem with Situation Awareness (SA) as the Intended Function**
 - Applicants cite SA or terrain awareness as the intended function
 - Difficult to define what terms mean
 - What is really being provided

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- **Situation Awareness (SA)**

Future guidance on SA

- AC/AMJ 25.1302 Installed Systems and Equipment for Use by the Flight Crew
- AC/AMJ 25-11 Transport Category Airplane Electronic Display Systems
- TAD SA Policy

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Showing Compliance:

- To show compliance with §25.1302(a), new functionality must be clear and understandable
- The new functionality must be comprehensive enough that it can be evaluated for compliance.

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Current Part 25 Position on Intended Function(s) For SV

- **To show compliance with §25.1301(a)**
 - Well defined and testable definition
 - Enough detail for test scenario development
 - Represent judgments pilot is intended to make
 - AFM limitations not desirable on obvious uses
 - Account for judgments pilot is likely to make

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Current Part 25 Position on Intended Function For SV

- Test plan should be developed to specifically assess the intended functions
- Pilot assessments should support the intended function without being misleading
- Testing should show that SV should not compromise the intended function of previous certifications and required equipment

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Current Part 25 Position on Intended Function For SV

- System safety assessment should fully account for the intended function and errors (Later detailed presentation)
 - Conflicting information between visual scene and other displayed information
 - Database configuration control
 - Pilot action for emergency/abnormal procedures.

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Current Part 25 Position on Intended Function For SV

- **Classes or Tiers**

- FAA anticipates SV will be divided into Classes or Tiers to differentiate between:
 - Capabilities
 - Certification requirements for different performance levels

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Method/questions for help in determining intended functions

- a. Does each feature and function have a stated intended function?
- b. What assessments, decisions, or actions are the flight crewmembers intended to make based on the display system?
- c. What other information is assumed to be used in combination with the display system?
- d. What is the assumed operational environment in which the equipment will be used (e.g., the pilots tasks and operations within the flight deck, phase of flight and flight procedures)?

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Examples of a basic “first tier” general awareness intended function for SV:

- A gross sense of the distance to significant terrain features and their direction relative to the current heading or track
- General sense of terrain contours.
- A gross sense that significant terrain is near, above, or below current altitude.

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We covered:

- **Issue(s)**
- **Background**
- **Rules and guidance (present and future)**
- **SA discussion**
- **FAA position**
- **SA Example & Questions**
- **Questions**



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Summary:

- **The FAA has the responsibility to meet its rule and guidance criteria for intended function**
- **Industry has the primary responsibility to detail their intended function such that it can be adequately tested**

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Questions And Discussion

