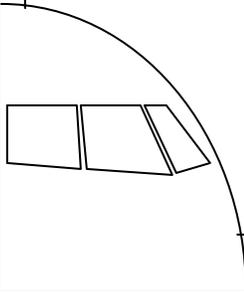


Part 25 Policy Development for Supplemental (Situation Awareness) Displays

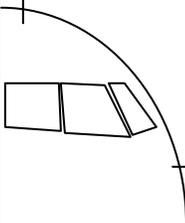


John McConnell
Transport Standards Staff, ANM-111
Transport Airplane Directorate
Renton, Washington
(425) 227-1365

Situation Awareness as Intended Function

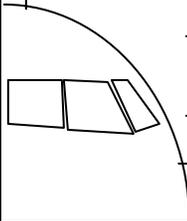
Applicants are identifying “situational awareness”, “positional awareness” and “for supplemental use” as the intended function of equipment and software.

- SA is a very broad concept, used in a variety of different ways
- There is no generally accepted Method of Compliance (metrics or criteria) to determine whether a design is appropriate to this intended function



SA as Intended Function - Issues

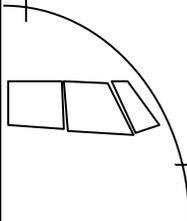
- **Defining intended function as “SA” is used to substantiate low failure hazard classifications and reduced design assurance.**
 - Rationale: information from SA display will never be used without direct corroboration
 - These reduced classifications may not reflect the actual risks
- **Attendant problems include:**
 - Proliferation of AFM limitations, with decreasing likelihood they will be consistently followed;
 - Increased requirements for continuous cross-check.



3

Relevant Rules

- §25.1301(a): *Each item of installed equipment must be of a kind and design appropriate to its intended function.*
- §25.1309(c): *. . . Systems, controls, and associated monitoring and warning means must be designed to minimize crew errors which could create additional hazards.*
- §25.1523(a): *The minimum flight crew must be established so that it is sufficient for safe operation, considering the workload on individual crewmembers.*
- §D25.1(b): *The following workload factors are considered significant when analyzing and demonstrating workload for minimum flight crew determination: . . . (5) The extent of required monitoring of the fuel, hydraulic, pressurization, electrical, electronic, deicing, and other systems while en-route.*



4

In the Past . . .

- **Compliance determinations could be inconsistent or incomplete.**
 - Assumed that because display is “supplemental” and for “situation awareness only” pilots will not base decisions or actions on it.
 - Relied on pilot assessments without specific definition of intended function and without structured methods of compliance.
- **FAA unable to make reasoned findings of compliance with §§ 25.1301(a) and 25.1309(c) because “situation awareness” is too broad and vague a definition of intended function.**

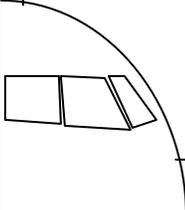
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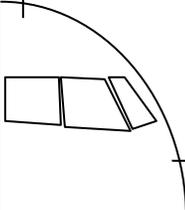
SA Displays Draft Policy - Objectives

Address four specific issues with respect to the standardized approval of ‘supplementary’ displays:

- Properly defining the intended function,
- Determining whether a display adequately performs its intended function(s), and
- Ensuring that the display is certified to an appropriate and consistent design assurance level, and
- Ensuring that the display design is consistent with the minimum flight crew.

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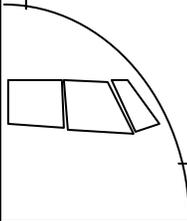
Relevant Rules	
	<p>§25.1301(a): <i>Each item of installed equipment must be of a kind and design appropriate to its intended function.</i></p> <p>§25.1309(c): <i>. . . Systems, controls, and associated monitoring and warning means must be designed to minimize crew errors which could create additional hazards.</i></p> <p>§25.1523(a): <i>The minimum flight crew must be established so that it is sufficient for safe operation, considering the workload on individual crewmembers.</i></p> <p>§D25.1(b): <i>The following workload factors are considered significant when analyzing and demonstrating workload for minimum flight crew determination: . . . (5) The extent of required monitoring of the fuel, hydraulic, pressurization, electrical, electronic, deicing, and other systems while en-route.</i></p>

Proposed Policy for Intended Function	
	<p>To demonstrate compliance with 25.1301(a), the applicant should identify:</p> <ol style="list-style-type: none">1. What specific assessment(s) a pilot could make based on the display, including ones that may not be intended by the designer?<ul style="list-style-type: none">- What details of the displayed information would be extracted?- What specific evaluations of the information would be made?- What other information do the pilots need to consider in combination with the display?

Intended Function (continued)

In addition to identifying assessments a pilot could make using the display, the applicant should also identify:

2. What specific pilot decisions and/or actions are likely to be based on or affected by the displayed information?
 - Maneuvering the airplane
 - Cross-checking with other information
 - Communicating with ATC
3. What specific pilot decisions and/or actions is the pilot not to make based on the display?
4. What conclusion is the pilot to draw and what action should be taken when the supplemental display disagrees with other information?

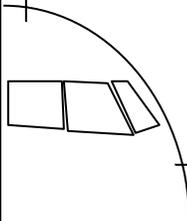


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Intended Function (concluded)

Having defined the intended function(s), the applicant should identify the descriptions, analyses, demonstrations, and/or tests that will show that the proposed design adequately supports that function. The MoC must enable the FAA to determine:

- The system provides sufficient information in a usable form.
- The information is sufficiently accurate, detailed and timely.
- There are specific and sufficient safeguards to ensure that the information will not be used inappropriately.
- The flight crew will detect and properly respond to disagreements between the SA display and other information sources.



10

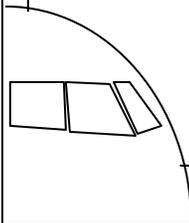
Relevant Rules

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§25.1309(c): *. . . Systems, controls, and associated monitoring and warning means must be designed to minimize crew errors which could create additional hazards.*

§25.1523(a): *The minimum flight crew must be established so that it is sufficient for safe operation, considering the workload on individual crewmembers.*

§D25.1(b): *The following workload factors are considered significant when analyzing and demonstrating workload for minimum flight crew determination:
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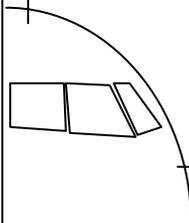


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Proposed Policy for Misleading Information

Analyses conducted to determine failure hazard classifications should take into account human factors principles and data.

1. It should be assumed that information presented to the flight crew will be used by them if its content and presentation are consistent with that use.
 - Incorrect information will be used if it cannot be distinguished from, or cannot be detected as, erroneous.
 - Should consider intended and unintended uses.
 - If hazardously inappropriate use of the system can be reasonably expected, the applicant should include design features that mitigate the hazard (e.g., by immediate indication of use limitations).

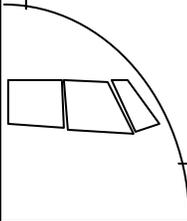


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Misleading Information (continued)

2. If potential for presenting misleading information cannot be avoided, the applicant should show how the pilot is expected to identify incorrect information on the display, and that this will be effective in service.

- Data show that unaided continuous cross-check can be unreliable, ineffective, and/or inconsistent with a two person flight crew.
- Detection of incorrect information can be further degraded by lack of one-to-one correspondence between sources.



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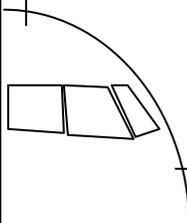
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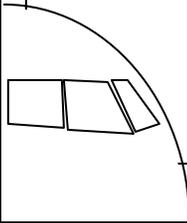


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Proposed Policy for Crew Size / Workload

Applicant must show that flight crew Workload Factors will not exceed acceptable levels for any Basic Workload Functions related to the intended function(s).

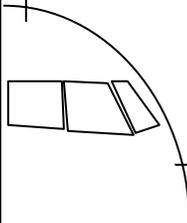
- Any additional cross-check or monitoring requirements for the new display will not compromise pilot performance so as to reduce the overall level of safety.
- Should be assessed in the context of the integrated flight deck in realistic scenarios.



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Questions

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