

PUBLIC COMMENTS
PROPOSED AC 25.1322-1X, FLIGHTCREW ALERTING

Commenter	Comment	Requested Change	Disposition
<p>Transport Canada Comment #1</p>	<p>Modern aircraft system design has become increasingly more highly integrated and complex through the use of shared, common resources for data/information processing. This level of integration also exists between cockpit indication systems and the display of information received from associated systems functions. Thus, the accurate display of systems operational information via the flightcrew alerting system and the suppression of specific alerts that may be inappropriate or unnecessary under certain conditions has become equally important. The ability of the alerting system suppression function to operate only in the expected manner is important to ensuring flightcrew situational awareness during potentially high workload situations. Inadvertent or erroneous activation of the suppression function, coupled with a system failure could result in failure effects greater than originally anticipated. For example, take the case of a wing anti-ice system single failure that would normally generate an amber visual alert requiring pilot action to either enable a cross-bleed function or depart icing conditions. Inadvertent suppression of this alert could lead to asymmetric ice buildup without sufficient flightcrew awareness thus increasing the criticality of the failure effects for this situation beyond that originally anticipated.</p>	<p>Draft § 25.1322(c) or the proposed AC mentioned in the NPRM, whichever is appropriate, should be amended to provide a means to monitor the suppression logic for inadvertent or erroneous activation, or that means be provided to mitigate such an occurrence.</p>	<p>We believe the AC already includes this information. Please see section 7 of the AC, titled <i>Alerting System Reliability and Integrity</i>, which addresses alerting system malfunctions and errors.</p> <p>No change was made to the AC in response to this comment.</p>

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	<p>With aircraft designs employing extensive use of systems functional integration the likelihood to integrate an independent function/logic for controlling suppression of flightcrew alerts has increased (e.g. an independent flight phase function/logic could be used for supplying data to the flightcrew alerting system). To ensure integrity of the dataflow from an integrated function such as the one described above, it is suggested that draft § 25.1322(c) or the proposed AC mentioned in the NPRM, whichever is appropriate, be amended to provide a means to monitor the suppression logic for inadvertent or erroneous activation or that means be provided to mitigate such an occurrence.</p>		

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<p>Stacy Moran Comment #2</p>	<p>While it is mentioned that consistent structure/syntax be used when creating alerts, this document does not give specific guidance. For example, the alert for the failure of the first engine could be displayed as ENGINE (System) 1 (Parameter) FAIL (Status). It should also be noted that the aural alerts should follow the same philosophy.</p>	<p>Add guidance regarding how to structure the visual and aural alert annunciations. Also, if the voice message requires repetition, what does it sound like...(does the whole phrase get said again i.e., ENGINE 1 FIRE, or is it supposed to be ENGINE 1 FIRE then FIRE ENGINE 1 or FIRE ENGINE 1 FIRE?</p>	<p>These are all good points and we agree, but we believe adequate detailed guidance is provided in the AC.</p> <p>Please refer to Appendixes 1 and 2 in the AC, which specifically address visual and aural alerts. Also, guidance for aural alerts is provided throughout the AC and includes aural alerts for multiple alerts. If even more precise detail is provided we are concerned that we may be dictating the design.</p> <p>No change was made to this AC in response to this comment.</p>
<p>Stacy Moran Comment #3</p>	<p>While there are recommendations regarding having the visual and aural alerts occur without a system delay, there was no mention for what is considered an acceptable time from the onset of the condition to when the alert (aural and visual) get displayed. MIL-1472F has general guidelines as well, but the question of how many milliseconds is acceptable seems to be an ongoing debate. Do the recommendations change for warnings, versus cautions and advisories?</p>	<p>Add specific recommendations for time frames that are acceptable from the onset of the condition to when the operator gets notified. Specify any differences in criteria for warnings, cautions and advisories.</p>	<p>In principle, for both caution and warning alerts, the alert should attract immediate attention and in the case of a warning alert, an immediate response is also required; however, we did not define a set time. We have debated the need for a definition of “immediate” and have looked for other examples in Title 14, Code of Federal Regulations, part 25. Ultimately we decided that if we differ from the dictionary definition of “immediate” we would need to set up another harmonization means to make that decision since the word “immediate” is shared with other rules beyond just alerting rules. In</p>

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			<p>summary, the ARAC tasking did not include defining the word “immediate.”</p> <p>What is considered “acceptable time” will have to be determined on a case-by-case basis. For the flightcrew alert to meet its intended function it will have to be timely enough for the flightcrew to make the appropriate response for that response to be effective (e.g. recovering the airplane, preventing exceedances, etc.)</p> <p>The recommendations for warnings, versus cautions and advisories, do change as stated in the rule language for § 25.1322. For example, a warning requires immediate awareness and an immediate response, but a caution requires immediate awareness and a subsequent response, not an immediate response. An advisory does not require immediate awareness or a subsequent response.</p> <p>No change was made to this AC in response to this comment.</p>

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<p>Stacy Moran Comment #4</p>	<p>There is no mention of using consistent acronyms or recommendations on acronym lists for alert syntax/structure. Also, if there is available space, should the word be spelled out entirely whenever possible or if the acronym is used for one alert, should it be used consistently in any other alerts that use the same word?</p>	<p>Add guidelines for acronym usage.</p>	<p>For flight deck displays the term “label(s)” is used rather than “acronym.” Advisory Circular (AC) 25-11A, <i>Electronic Flight Deck Displays</i>, includes guidance for using labels. AC 25.1322-1, paragraph 13.c.(1)(d) includes information regarding consistent labeling.</p> <p>No change was made to this AC in response to this comment.</p>
<p>Stacy Moran Comment #5</p>	<p>Nothing was mentioned about using hot words (i.e., when it is best to use words like FAIL or FAULT for alert syntax). There was no definition of FAULT in the standard at all. We use FAULT for losses of redundancy, where the system still is operating but not to its full capacity.</p>	<p>Add text regarding hot words and provide a definition of FAULT versus FAIL.</p>	<p>You are correct. The ARAC working group did not provide a list of hot words. One concern was that this might be too design specific. “Failure” is defined in AC 25.1322-1 and references to other publications using the word “Fault” are also included in AC 25.1322-1.</p> <p>No change was made to this AC in response to this comment.</p>

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<p>Stacy Moran Comment #6</p>	<p>For several important flight critical functions it may be useful to provide feedback advisories which are low level alerts to confirm to the pilot that a certain action has been taken.</p>	<p>Add text to the advisory definition that it can be used to confirm a certain action/procedure was taken on behalf of the pilot.</p>	<p>We decided not to add additional text to the advisory definition because we believe that this is too design specific, and may start to degrade alerting because of too many messages. Also, we were not certain as to the meaning of a “feedback advisory” since this seems to be used in a different context compared to an alert advisory. Furthermore, the comment seems related to certain actions that might appear on a checklist in response to a system action.</p> <p>No change was made to this AC in response to this comment.</p>

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<p>Stacy Moran Comment #7</p>	<p>Having unique tones for both warnings and cautions can become overwhelming depending on how many cautions are in the system and how many other tones are being used to annunciate various conditions.</p>	<p>No specific change requested.</p>	<p>We agree with the commenter that too many unique tones can be overwhelming for the flightcrew. That is one reason why we require suppressing the attention-getting effects of nuisance and false alerts, why inhibits are used, and why we prioritize alerts. Grouping alerts into umbrella and collector alerts is another way to reduce the number of alerts. Appendix 2 of this AC addresses limiting tones and provides guidance on handling multiple alerts.</p> <p>No change was made to this AC in response to this comment.</p>

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<p>Stacy Moran Comment #8</p>	<p>The recommended frequency of tones of 200-4500 Hz should be revised (even though similar ranges are specified in MIL-STD-1472F). We've discovered through testing that any tone below 300 Hz is too low and gets lost in the noise since it is too close to the frequency of human speech.</p>	<p>Revise frequency recommendation.</p>	<p>The ARAC working group recommendations were based on data available at the time the working group report was written. Since the commenter did not provide specific test data it would be difficult to examine the recommendation in detail.</p> <p>Appendix 2, paragraph 1.b. of AC 25.1322 states that "Each sound should differ from other sounds in more than one dimension (frequency, modulation, sequence, intensity) so that each one is easily distinguishable from the others."</p> <p>No change was made to this AC in response to this comment.</p>

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<p>Hawker Beechcraft Comment #9</p>	<p>Draft AC 25.1322-1 X should provide additional guidance on how to address the visual, tactile and aural warnings for situations where multiple warnings occur. Multiple warnings each with their own aural warning could get very confusing to the crew. For example we would suggest for an occurrence of multiple "red" warnings the aural alert (triple chime) occurs only once, not once for each "red" message. Similarly for the occurrence of multiple "amber" messages, the aural alert (double chime) occurs only once. HBC would like this method to be shown as acceptable or have other methods covered by the AC.</p>	<p>Draft AC 25.1322-1 X should provide additional guidance on how to address the visual, tactile and aural warnings for situations where multiple warnings occur.</p>	<p>Chapter 8 of the AC, "MANAGING ALERTS" addresses multiple visual and aural alerts. Also, Appendixes 1 and 2 of the AC provide additional guidance for visual and aural alerts. Our concern is that the commenter's suggestion is too design specific to be placed in the AC.</p> <p>No change was made to this AC in response to this comment.</p>

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<p>AIRBUS Comment #9</p>	<p><u>Paragraph 5. b. (8),page 7</u> Current AC draft text says: --Quote-- <i>“(8) For visual alerts on multicolor displays, the colors red, amber, and yellow must be used consistently throughout the flight deck [...]</i>” --Unquote--</p> <p>The requirement to limit the use of the color yellow to caution alert indications, is considered as too much restrictive, as substantiated in comment #8 about paragraph 11.a.(2) of the AC for the color standardization.</p>	<p>Airbus proposes that paragraph 5.b. (8) be modified as follows :</p> <p><i>“(8) For visual alerts on multicolor displays, the colors red and amber must be used consistently throughout the flight deck [...]</i>”</p>	<p>We revised the sentence and format but we are still limiting the use of the color “yellow.” The color yellow is visually similar to the color amber and can be difficult to visually distinguish from amber.</p>

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<p>Gulfstream Comment #10</p>	<p>Page 8: Section 6b. Time-critical Warnings. Gulfstream agrees that time-critical alerts should be the highest priority, and offers that this should be in the rule: these alerts were carefully defined in the draft HWG committee advisory material and they have been somewhat diluted in the new draft AC as well as taken out of the rule. This rationale is based on new monitor warning architecture queues driving prioritization of alerting as well as presentation of alerts <i>(e.g., .wav files and interrupts)</i></p>	<p>Add time-critical to rule.</p>	<p>In response to this comment, and other similar comments, we revised both the rule and AC text. Section 25.1322(c)(1) now requires that alerts be prioritized within a given category. A typical example of prioritizing alerts within categories is the time-critical warning alert which, to meet its intended function, must have higher priority on a display than a general warning alert. This change to the final rule strengthens the case for prioritizing alerts within categories that was part of the original ARAC working group recommendations.</p> <p>We changed the AC to include time-critical warnings.</p>
<p>AIRBUS Comment #11</p>	<p><u><i>Paragraph 8. a. (2), page 10</i></u> Current AC draft text says: --Quote-- <i>“The prioritization scheme within each alert category, as well as the rationale, should be documented and evaluated, per paragraph 14, Showing Compliance For Approval Of A Flightcrew-Alerting System, below.”</i> --Unquote-- Airbus considers that a prioritization scheme can</p>	<p>The prioritization scheme within each alert category, as well as the rationale, should approved by the Civil Airworthiness Authorities. Evaluations, analysis and in service experience are appropriate means to justify the prioritization scheme.</p>	<p>AC 25.1322-1 contains numerous references to prioritization. Many sources of information can be provided to the FAA to include service experience, however the ARAC final report, the § 25.1322 rule, and AC 25.1322-1 are silent on the use of service experience to justify any prioritization scheme. It is difficult to validate service experience and the justification would have to be built on a case-by-case basis if an alternative means</p>

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	<p>be a result of:</p> <ul style="list-style-type: none"> - A few basic principles; - A consolidated experience from already certified FWS systems, completed with positive in-service experience. <p>The prioritization scheme within each alert category, as well as the rationale, should be given to Authorities for approval. Evaluations, analysis and in service experience are appropriate means to justify the prioritization scheme.</p>		<p>of compliance is suggested. It should also be recognized that the rule and AC 25.1322-1 were based on service experience and principle.</p> <p>We revised § 25.1322(c)(1) to require that alerts be prioritized within a given category. A typical example of prioritizing alerts within categories is the time-critical warning alert which, to meet its intended function, must have higher priority on a display than a general warning alert. This change to the final rule strengthens the case for prioritizing alerts within categories that was part of the original ARAC recommendations. We revised paragraph 8.of the AC to include additional guidance for prioritization.</p>

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<p>AIRBUS Comment #12</p>	<p><u><i>Paragraph 8. a. (3), page 10</i></u> Current AC draft text says: --Quote-- <i>“Documentation should include the results of analyses and tests that show that any delayed or inhibited alerts do not adversely impact safety.”</i> --Unquote--</p> <p>Airbus suggests that the experience from already certified FWS systems may be used when relevant for the evaluation of the delayed or inhibited alerts if any. Experience consists of already validated substantiations from previous certification activities about similar design, complemented or not with positive in-service experience.</p>	<p>Airbus suggests that the experience from already certified FWS systems may be used when relevant for the evaluation of the delayed or inhibited alerts, if any.</p>	<p>Many sources of information can be provided to the FAA to include service experience; however, the ARAC final report, the § 25.1322 rule, and the AC are silent on the use of service experience to justify any prioritization scheme. It is difficult to validate service experience and the justification would have to be on a case-by-case basis if an alternative means of compliance is suggested. It should also be recognized that the rule and AC 25.1322-1 were based on service experience and principle.</p> <p>No change was made to this AC in response to this comment.</p>

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<p>AIRBUS Comment #13</p>	<p><u><i>Paragraph 8. c. (3), page 11</i></u> Current AC draft text says: --Quote-- <i>“Multicolor displays must conform to the alert color convention provided in § 25.1322(d) so the flightcrew can easily distinguish the alert urgency ...”</i> --Unquote--</p> <p>Multicolor displays must be consistent with § 25.1322(d) and 25.1322(f) [taking into account AIRBUS comments raised on those paragraphs of the NPRM]. Moreover, the alert color convention is not the only means to distinguish the alert urgency. The alert urgency is above all managed by the prioritization mechanism of the alerting system in accordance with the associated rule NPRM § 25.1322 (b), and by a combination of solutions (including at least two different senses as per NPRM § 25.1322 (a)(1)).</p>	<p>Refer to Airbus comments about paragraph 11 of the proposed AC regarding color standardization. More generally, multicolor displays must be consistent with §§ 25.1322(d) and 25.1322(f) [taking into account AIRBUS comments raised on those paragraphs of the NPRM].</p>	<p>Paragraphs in § 25.1322 were revised to indicate what colors are used for alerts and the limitation of the use of alerting colors. Use of the color “yellow” is still limited, primarily because of its visual similarity to amber.</p> <p>No change was made to this AC in response to this comment.</p>

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<p>AIRBUS Comment #14</p>	<p><u><i>Paragraph 8. d. (4), page 11</i></u> Current AC draft text says: --Quote-- <i>“For as long as the inhibit exists, there should be a clear and unmistakable indication that the flightcrew manually inhibited that alert.”</i> --Unquote--</p> <p>Current Airbus alerting systems cannot inhibit alerts one by one and they do not give any status of all the inhibited alerts. The reason of such alerting philosophy is to minimize the crew workload, nuisance effects (as per NPRM § 25.1322 (c), and more particularly 25.1322 (c)(2)). From Airbus viewpoint, there are no foreseen operational benefits in displaying to the crew the indication that they have intentionally inhibited alerts, and inhibition may be deduced by the crew through the status display of the systems the crew has manually inhibited (e.g. TCAS off).</p>	<p>Current Airbus alerting systems cannot inhibit alerts one by one and they do not give any status of all the inhibited alerts. The reason of such alerting philosophy is to minimize the crew workload, nuisance effects (as per NPRM § 25.1322 (c), and more particularly 25.1322 (c)(2)).</p> <p>From Airbus viewpoint, there are no foreseen operational benefits in displaying to the crew the indication that they have intentionally inhibited alerts, and inhibition may be deduced by the crew through the status display of the systems the crew has manually inhibited (e.g. TCAS off).</p>	<p>The AC guidance language is the same as the ARAC recommendation. Please view the last sentence in the following excerpt from paragraph 8.d.(4).</p> <p style="text-align: center;"><i>(4) For operational conditions not recognized by the alerting system, provide a means for the flightcrew to inhibit a potential alert that would be expected to occur as the result of the specific operation (for example, preventing a landing configuration alert for a different landing flap setting). For as long as the inhibit exists, there should be a clear and unmistakable indication that the flightcrew manually inhibited that alert.</i></p> <p>No change was made to this AC in response to this comment.</p>

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<p>AIRBUS Comment #15</p>	<p><u>Paragraph 9. b, page 12</u> Current AC draft text says: --Quote-- <i>“The visual alert message must be removed from the display when the condition no longer exists ...”</i> --Unquote--</p> <p>The requirement should be flexible enough to allow some tolerances or exceptions, notably when:</p> <ul style="list-style-type: none"> - Data or parameters, required to determine the condition, are not available; - The procedure must be carried out up to its end, even if the alerting situation no longer exists, in accordance with AC 25.1322-1X (Appendix 1, paragraph 3.b.(4)). 	<p>Airbus proposes that paragraph 9. b. be modified as follows :</p> <p><i>“The visual alert message must be removed from the display when it is confirmed that the condition no longer exists, except if justified.”</i></p>	<p>The guidance in the AC is based on the § 25.1322 rule language and the language from the ARAC recommendations. Our concern is that adding the words “except if justified” will place an extra burden on the flightcrew to confirm if removal of a visual alert is justified. If the condition no longer exists it can be classified as a nuisance. In addition, some alerts cannot be easily confirmed as to whether the condition continues to exist.</p> <p>No change was made to this AC in response to this comment.</p>

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<p>AIRBUS Comment #16</p>	<p><u><i>Paragraph 10. c, page 12</i></u> Current AC draft text says: --Quote-- <i>“In all cases, the airplane- or system-certification test program should verify that the alerts provide or direct the flight crew to the correct procedures.”</i> --Unquote--</p> <p>Airbus suggests that that the experience from already certified FWS systems may be used when relevant for the evaluation of the access to the procedures by the flightcrew. Experience consists of already validated substantiations from previous certification activities about similar design, complemented or not with positive in-service experience.</p>	<p>Airbus suggests that that the experience from already certified FWS systems may be used when relevant for the evaluation of the access to the procedures by the flightcrew. Experience consists of already validated substantiations from previous certification activities about similar design, complemented or not with positive in-service experience.</p>	<p>Many sources of information can be provided to the FAA to include service experience; however, the ARAC final report, the § 25.1322 rule, and the AC are silent on the use of service experience to justify any prioritization scheme. It is difficult to validate service experience and the justification would have to be on a case-by-case basis if an alternative means of compliance is suggested. It should also be recognized that the rule and AC 25.1322-1 were based on service experience and principle.</p> <p>No change was made to this AC in response to this comment.</p>

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<p>Gulfstream Comment #17</p>	<p><u>Page 12: Section 11.</u> Color Standardization. The Gulfstream flight crew alerting philosophy follows the current § 25.1322(d) criteria and is in line with the proposed AC: red for warning, amber for caution and blue for advisory indications. Green indications have different meanings on Gulfstream flight decks but are always used for normal conditions. However, the Gulfstream philosophy differs with regard to the use of yellow for caution indications. Gulfstream utilizes yellow to show old, or outdated information, i.e. yellow time stamps for weather radar info that has passed, or for waypoints that have been cycled (e.g., "from" waypoints). We comply with amber for caution in all other instances.</p>	<p>Gulfstream contends that yellow should be used in other parts of the displays for non-alerting tasks, as appropriate for context of use and to maintain consistency across flight decks.</p>	<p>The § 25.1322 rule language states that alerting colors such as red, amber and yellow must be limited and not adversely affect alerting. The rationale is provided in the AC language as shown below. Again part of the concern is the visual similarity of yellow and amber. This restriction is also an ARAC recommendation and found in the guidance in the obsolete AC 25-11. In AC 25.1322-1 we accepted use of the alerting colors in some non-alerting cases, such as for certain functions in weather and TAWS displays that provide safety related awareness information and for function and indications listed in AC 25-11A under the paragraph on color coding.</p> <p>We added the section from AC 25-11A on color coding to the list of acceptable uses of alerting colors for non-alerting functions. However, § 25.1322 takes precedence over the guidance in AC 25-11A if there is any conflict.</p>

<p>AIRBUS Comment #18</p>	<p><u>Paragraph 11. a. (2), page 12</u> Current AC draft text says: --Quote-- <i>“(2) Amber or yellow for caution-alert indications.”</i> --Unquote--</p> <p>The requirement to limit the color yellow to caution alert indications only, is considered as too much restrictive.</p> <p>Airbus cockpit philosophy is amber for abnormal situations, and the color yellow is extensively used in all Airbus cockpits to distinguish some specific data from other non-abnormal data, but not for alerting purposes. For instance, aircraft mock-up, roll pointer, boxes on PFD are in yellow. Yellow is used to display background elements on the airport moving map. In the same way, many FMS information are in yellow to indicate temporary states, i.e. before their validation (e.g. temporary flight path, etc.), but they are not alerts. Experience has shown that amber and yellow colors and their meaning are clearly distinguished by crews operating Airbus aircraft. The use of yellow has never been restricted by any regulations up to now, and more particularly, by the current Title 14 Code of Federal Regulations (14CFR) § 25.1322, which has been effective since 1977. Therefore, Airbus proposes that only the amber color be used for caution alerts.</p>	<p>As a consequence, Airbus proposes that paragraph 11.a.(2) be modified as follows :</p> <p><i>“(2) Amber for caution-alert indications.”</i></p>	<p>We do not agree that flightcrews can always easily distinguish between yellow and amber because yellow is visually similar to amber. This point is also made in the now obsolete AC 25-11.</p> <p>No change was made to this AC in response to this comment.</p>
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**AIRBUS
Comment #19**

Paragraph 11. a. (3), page 12

Current AC draft text says:

--Quote--

“(3) Any color except red, amber, yellow, or green for advisory-alert indications.

Note 4: Green is usually used to indicate “normal” conditions; therefore, it is not an appropriate color for an advisory alert, which is used to indicate a “non-normal” condition.”

--Unquote--

The prohibition of amber and green for advisory alert indications is considered by Airbus as too much restrictive. This would imply the introduction of an additional color that Airbus believes would degrade crew understanding of system synoptic and cockpit messages.

Amber is extensively used on Airbus aircraft for advisory alerts such as:

- Inoperative or abnormal system status (e.g. pumps, valves, computer status, system parameters, fluid level, pressure, temperature, etc.);
- Unknown status (e.g. system monitoring fault, cross in amber on synoptic of ECAM System Display page);
- Fields of some FMS pages requiring data to be entered by the flightcrew (e.g. required speeds or fuel system initialization);
- Invalid entries (e.g. incorrect RMP entries);
- Messages concerning navigation;
- FMS constraints monitoring (missed constraints like time, altitudes and speeds);
- FMS advisory messages on MFD page;
- ECAM memo that may be coded either in amber or in green according to the flight phase for reminder/alerting purposes (e.g. PWS OFF in amber or green).

Today, the definition is very simple and understandable: "amber" means "abnormal condition."

The use of only one color such as amber to cover cautions and some similar advisory alert indications makes the interpretation of a system status easier in any configuration (single or multiple failures, voluntary action or not). That reduces risk of misinterpretation, the crew workload and therefore, that contributes to an overall safety enhancement.

An advisory indication may use the green color as well, but generally associated with another means to distinguish it from normal conditions. For instance, flashing green is used for some parameters approaching, but not beyond, limit values. Green can be used as an advisory indication to address a condition that could become abnormal later during the flight (e.g. an engine approaching oil low level may be considered as acceptable for a short remaining flight time but not for a long-range flight).

Airbus considers that the main objective of the proposed rule

As a consequence, Airbus proposes that:

- **Note 4 be removed,**
- **And paragraph 11. a. (3) be modified as follows :**
“(3) Any color except red for advisory-alert indications.”

In response to this comment we revised paragraph 11a(3) and removed “amber” and “yellow” from the list of colors that cannot be used for an advisory alert. That text now states *“Any color except red or green for advisory alert indications.”*

We do not agree that the color green should be used as an advisory alert. Advisory alerts should only indicate “non-normal” conditions and, as stated in AC 25-11A, *Electronic Flight Deck Displays*, we believe that green should only indicate “normal conditions.” We retained the text of Note 4 but changed the nomenclature by removing “Note 4.”

<p>AIRBUS Comment #20</p>	<p><u>Paragraph 11. b, page 12</u></p> <p>Airbus suggests that the color yellow be used without any restrictions instead of being reserved for alerting functions, as already substantiated in our comment #8 Airbus suggests that the color green be allowed for advisory alerting functions as already substantiated in our comment #9</p>	<p>As a consequence, Airbus proposes that paragraph 11.b. be modified as follows:</p> <p><i>“The colors red and amber must be used for flightcrew caution and warning alerting functions (§ 25.1322(d)). Discrete lights and indicators associated with advisory alerting functions should use any color, except red for advisory alerting functions. Standardize the color used for advisory alerting functions within the flight deck</i></p> <p><i>Note 5: The objective is to limit the use of red and amber within the flight deck so that these colors are always attention getting and provide an indication of immediacy of response commensurate with the associated hazard.”</i></p>	<p>We do not agree with the commenter’s proposed revision. We believe the color yellow, like amber and red, must be limited.</p> <p>As previously stated, we do not agree that the color green should be used for alerts since green indicates “normal.” An alert should only appear for a non-normal condition.</p>
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<p>Hawker Beechcraft Comment #21</p>	<p>Section 11 d. of Draft AC 25.1322-1 X limits the use of red, amber and yellow for functions other than flightcrew alerting but does so in a manner that is not consistent with AC 25-11. HBC would like to see AC 25.1322-1X harmonized with AC 25-11. HBC also believe there should be some coverage of how to review the existing overall cockpit color design philosophy for an aircraft such that a small change does not involve <i>the complete redesign of the cockpit</i></p>	<p>Align AC 25.1322-1X with AC 25.11.</p> <p>Provide additional guidance regarding integrating the new requirements into an existing cockpit.</p>	<p>AC 25-11 was revised in June 2007 and is now AC 25-11A. AC 25-11A should be consistent with AC 25.1322-1. Chapter 14 of AC 25.1322-1, <i>INTEGRATING FLIGHTCREW-ALERTING-SYSTEM ELEMENTS INTO THE EXISTING FLEET</i>, addresses integrating the new requirements in § 25.1322 into an existing flight deck. The ARAC working group was not tasked with how to review all designs, only how to fit the new requirements into older flight decks when necessary. The Changed Product Rule (14 CFR 21.101) also includes information regarding integrating new requirements into an existing product.</p>
<p>AIRBUS Comment #22</p>	<p><u><i>Paragraph 11. d, page 13</i></u> The requirement to limit the color red to warning alert indication (refer to paragraph 11.d.(1) of the AC), is considered as too much restrictive, i.e. if warning alerts are restricted to conditions that require immediate flight crew response. Red should be allowed to alert the flightcrew about failure of radionavigation sensors (VOR, DME, ILS, etc.) providing raw data to be displayed, even if an immediate flightcrew response is not systematically required. Indeed, the radionavigation sensors and associated display cannot determine which type of operations is flown or will be flown and so, the color coding must always consider the worst case, notably interruption of an operation or possible significant adverse impact on a forthcoming operation or the mission. For instance, a VOR failure may lead to stop a VOR approach (thus requiring an immediate flightcrew response), whereas the same VOR system failure in cruise does not require an immediate flight crew response (but it will prevent a VOR approach which was planned at</p>	<p>As a consequence, Airbus proposes that paragraph 11. d. be modified as follows:</p> <p><i>“d. Section 25.1322(f) requires that the use of red and amber for functions other than flightcrew alerting of non-normal conditions be limited and not adversely affect flightcrew alerting of non-normal conditions. If these colors are proposed to be used in any functions other than non-normal alerting, the applicant should submit rationale to the FAA for review and approval. The rationale should include the benefits of using those colors and why the use of red and amber is appropriate for the intended non-alerting task and the context of use. For consistency, the same color criteria used for alerting non-normal conditions should be followed:</i></p>	<p>This paragraph of the AC was revised based on public comments and harmonization with EASA and now states: <i>d. Where red, amber and yellow are proposed for non-flightcrew alerting functions, substantiate that there is an operational need to use these colors to provide safety related awareness information.</i></p> <p>In paragraph 11.g. ee added a reference to AC 25-11A, Table 12, to the list of examples for acceptable use of alerting colors for non-alerting functions.</p> <p>Section 25.1322(f) states: <i>Limit the use of the colors red, amber, and yellow for functions other than flightcrew alerting so that such use does not adversely affect flightcrew alerting.</i></p> <p>Deviations from the rule normally require exemptions.</p>

	<p>destination).</p> <p>The requirement to limit the color yellow to alerting function, and dedicated to caution alert indications (refer to paragraph 11.d.(2) of the AC), is considered as too much restrictive, as already substantiated in comment #8.</p> <p>Note #6 in paragraph 11.d of the AC mentions a non-alerting use of red, amber and yellow for graphical depictions of weather phenomena and of terrain elevation. Airbus considers as inappropriate this non-alerting classification. Indeed, the use of red, amber and yellow for graphical depictions of weather phenomena and of terrain elevation, is to alert the flightcrew about conditions that are precursors to potential time-critical-warning conditions, or about conditions that may have significant adverse impact on a forthcoming operation or the mission.</p> <p>Moreover, color convention used by weather and TAWS systems is given by AEEC ARINC standards (708 for RADAR/PWS, 735A for TCAS, 762 for TAWS).</p> <p>Consequently, the current draft AC is conflicting with those industry standards used by all equipment suppliers and airframers, and already recognized by the authorities through already obtained equipment qualification approvals (TSO) or systems certifications.</p> <p>Airbus reminds as well that all current weather radar and TAWS systems use the color magenta for flightcrew alerting purposes:</p> <ul style="list-style-type: none"> - Magenta is used in the weather radar system to alert about a turbulence ahead, as the red could do so. - Magenta is used in the TAWS system for advisory alert indications. <p>Therefore, Airbus proposes that the use of red, amber, yellow and green be systematically considered as acceptable with no restrictions or</p>	<p><i>(1) Only use red for conditions that require immediate flightcrew awareness and immediate flightcrew response.</i></p> <p><i>(2) Only use amber for conditions that require immediate flightcrew awareness and less urgent subsequent flightcrew response.</i></p> <p><i>“Note 6 : Deviations are acceptable for the use of red for failure flags on Primary Flight Display and Navigation Display that may require immediate crew awareness and response. Graphical depictions of a weather phenomenon, such as weather radar and data link weather information, may use red and amber colors, in accordance with applicable widely spread standards, to represent locations of varying weather intensity or severity. This also applies to the use of red and amber on TAWS displays that provide an awareness of terrain elevation relative to the airplane, or on TCAS sector display.”</i></p>	<p>Regarding the incorrect reference in Note 6 of the proposed AC, this was corrected in the final AC.</p>
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	<p>limitations to display weather and terrain hazard levels, and to display TCAS sector. In this case, green is for guidance purposes in the frame of a TCAS resolution advisory.</p> <p>On the other hand, note 6 of the AC refers to paragraph 12c of the AC, which is inappropriate.</p>		
<p>Hawker Beechcraft Comment #23</p>	<p>There appears to be a mistake in the AC in section II Note 6 it references" 12 c above". Section 12 follows this comment and does not appear relevant.</p>	<p>Correct this error.</p>	<p>We corrected this error in the final AC.</p>

<p>AIRBUS Comment #24</p>	<p><u>Paragraph 12.c, page 14</u> Current AC draft text says: --Quote-- “c. Remove the presentation of the alert when the condition no longer exists.” --Unquote--</p> <p>Our comment is similar to our comment #6 on paragraph 9. b.:the requirement should be flexible enough to allow some tolerances or exceptions, notably when :</p> <ul style="list-style-type: none"> - Data or parameters required to determine the condition are not available; - The corrective procedure must be carried out up to its end, even if the alerting situation no longer exists, in accordance with the requirement given in appendix 1, paragraph 3.b.(4) of the AC. 	<p>Airbus proposes that paragraph 12.c be modified as follows:</p> <p>“c. Remove the presentation of the alert when <u>it is confirmed that the condition no longer exists, except if justified.</u>”</p>	<p>Section 25.1322(a)(3) states that <i>flightcrew alerts must: be removed when the alerting condition no longer exists.</i></p> <p>We cannot provide a deviation to the rule in the AC. Also, retaining the alert when it no longer exists is misleading to the crew and may create unintended consequences.</p> <p>The language in Appendix 1, regarding time-critical alerts, moved to paragraph 3.b.(4) in the final AC, was modified to provide examples of pilot corrective actions taken so the alerting condition no longer exists. For example, if there is a time-critical warning regarding terrain, when the pilot commands the airplane to climb above the terrain the warning goes away because the corrective action was completed.</p>
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<p>AIRBUS Comment #25</p>	<p><u><i>Paragraph 13b, page 14</i></u></p> <p>Paragraph 13.b of the AC does not allow the reader to conclude if section (c)(4) of the proposed rule can be satisfied, because this section (c)(4) is very ambiguous. Paragraph 13.b seems to only address suppression of attention-getting components of a false alert activated due to a failure of the alerting system.</p> <p>If section (c)(4) of the proposed rule addresses suppression of the alert as well, then paragraph 13.b of the AC should provide additional guidelines, and more particularly acceptable means of compliance related to the suppression of an alert.</p> <p>It should be clarified:</p> <ul style="list-style-type: none"> - That only false alerts caused by a failure of the alerting system have to be considered (that includes instability in detection of an alert); - Whether only the attention getting component must be suppressed or the alert must be suppressed as well, and if it is a temporary or definitive suppression (i.e. attention getting component or alert suppressed for ever even if the condition still exists or comes back); - Whether an inadvertent suppression has to be mitigated; - Whether an inadvertent suppression has to be annunciated and how? (to annunciate for which alert the attention getting component has been suppressed? or to annunciate that one alert or more have been suppressed? or to annunciate which alert has been suppressed? or to annunciate that the aural alert capability of the alerting system has been inhibited for all the alerts? ...) 	<p>If section (c)(4) of the proposed rule addresses suppression of the alert as well, then paragraph 13.b of the AC should provide additional guidelines, and more particularly acceptable means of compliance related to the suppression of an alert.</p> <p>It should be clarified:</p> <ul style="list-style-type: none"> - That only false alerts caused by a failure of the alerting system have to be considered (that includes instability in detection of an alert); - Whether only the attention getting component must be suppressed or the alert must be suppressed as well, and if it is a temporary or definitive suppression (i.e. attention getting component or alert suppressed for ever even if the condition still exists or comes back); - Whether an inadvertent suppression has to be mitigated; - Whether an inadvertent suppression has to be annunciated and how? (to annunciate for which alert the attention getting component has been suppressed? or to annunciate that one alert or more have been suppressed? or to annunciate which alert has been suppressed? or to annunciate that the aural alert capability of the alerting system has been inhibited for all the alerts? ...) <p>On the other hand, the last sentence of paragraph 13.a (<i>"This means must not be readily available to the flightcrew</i></p>	<p>The rule addresses suppressing an attention-getting component of an alert caused by a failure of the alerting function that interferes with the flightcrew's ability to safely operate the airplane.</p> <p>It is presumed that nuisance alerting will have been prevented (§ 25.1322(d)(1)). However, a means to suppress the attention-getting component of an alert caused by failure of the alerting function must be provided. For example, the ability to suppress an aural alert that prevents or interferes with the crew's ability to safely operate the airplane. If this attention-getting component is suppressed there must be a clear and unmistakable annunciation to the flightcrew that the function has been suppressed. Depending on the design this may mean suppression of all aural or suppression of the alert creating the aural for example.</p> <p>The rule states that the means for the suppression should not be readily available to the flight crew so that it could be operated inadvertently or by habitual reflexive actions. If it inadvertently activated the crew should become aware of the inadvertent activation since there will be a clear and unmistakable annunciation that it has been suppressed.</p> <p>We asked FAA test pilots if the switch light in front of the pilot would be considered a ready means and they said it was not.</p>
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	<p>On the other hand, the last sentence of paragraph 13.a (“<i>This means must not be readily available to the flightcrew [...]</i>”) is conflicting with paragraph 13.b. Indeed, the switch light in front of the pilot is per definition a readily available means.</p>	<p>[...]”) is conflicting with paragraph 13.b. Indeed, the switch light in front of the pilot is per definition a readily available means.</p>	
<p>AIRBUS Comment #26</p>	<p><u>Paragraph 14. c. (3), page 16</u></p> <p>Same comment as comment #7.</p> <p>Comment # 7: <u>Paragraph 10. c, page 12</u> Current AC draft text says: --Quote-- <i>“In all cases, the airplane- or system-certification test program should verify that the alerts provide or direct the flight crew to the correct procedures.”</i> --Unquote-- Airbus suggests that that the experience from already certified FWS systems may be used when relevant for the evaluation of the access to the procedures by the flightcrew. Experience consists of already validated substantiations from previous certification activities about similar design, complemented or not with positive in-service experience.</p>	<p>Airbus suggests that that the experience from already certified FWS systems may be used when relevant for the evaluation of the access to the procedures by the flightcrew. Experience consists of already validated substantiations from previous certification activities about similar design, complemented or not with positive in-service experience.</p>	<p>Many sources of information can be provided to the FAA to include service experience; however, the ARAC final report, the § 25.1322 rule, and the AC are silent on the use of service experience to justify any prioritization scheme. It is difficult to validate service experience and the justification would have to be on a case-by-case basis if an alternative means of compliance is suggested. It should also be recognized that the rule and AC 25.1322-1 were based on service experience and principle.</p> <p>No change was made to this AC in response to this comment.</p>

<p>GAMA Comment #27</p>	<p>Related to the restriction of color palettes for other than alerting functions, Section 16.f. of the draft AC provides guidance that multi-color HUDs should be consistent with HDD PFD presentations in their use of color. To the extent that color is used as a warning and caution alert discriminator, the guidance should add that all colors <u><i>used should be discernable in all outside environment lighting conditions in which the HUD is to be operated.</i></u></p>	<p>To the extent that color is used as a warning and caution alert discriminator, the guidance should add that all colors used should be discernable in all outside environment lighting conditions in which the HUD is to be operated.</p>	<p>This type of general guidance is already provided in AC 25-11A.</p> <p>No change was made to this AC in response to this comment.</p>
<p>AIRBUS Comment #28</p>	<p><u>Paragraph 1. f, page A1-2</u></p> <p>The requirement to limit the color yellow to caution alert indications, is considered as too much restrictive, as already substantiated in comment #8.</p>	<p>Airbus proposes that:</p> <ul style="list-style-type: none"> - The 2nd bullet in paragraph 1.f.(1) of Appendix 1 be modified as follows: <ul style="list-style-type: none"> • “Amber for caution”; - And paragraph 1.f.(2) of Appendix 1 be modified as follows: <ul style="list-style-type: none"> “(2) Master visual alerts for conditions other than warnings or cautions (for example, Air Traffic Control (ATC) Datalink alerts) must be in a color other than red and amber (§ 25.1322 (d)).” 	<p>We do not agree that a change is needed to the AC. Section 25.1322 states that both yellow and amber can be used for caution level alerts.</p> <p>No change was made to this AC in response to this comment.</p>

<p>AIRBUS Comment #29</p>	<p><u>Paragraph 2. b. (4),page A1-3</u> Current AC draft text says : --Quote-- <i>“Use indications to show the number and urgency levels of the alerts stored in memory.”</i> --Unquote--</p> <p>Airbus considers that this requirement is too much solution-prescriptive. It would be up to the applicant to define the best solution considering other alerting system features and characteristics, Human Factors considerations, operational needs and lessons-learned from previous alerting systems developments.</p> <p>Significant Airbus experience on this topic has shown that there is no need at all to display the number and urgency levels of the alerts stored in memory. That can be source of nuisance effects. The Airbus alerting philosophy is based on the prioritization, just with an overflow indication, in order that all the flightcrew attention remain focused on only one alert which has the highest priority. The prioritization reflects the Standard Operating Procedures (SOP), so the flightcrew would deviate from SOP, with a possible adverse effect on safety, if they would review less urgent alerts whereas higher urgent alerts must be processed first.</p> <p>So, the solution proposed by the AC should be considered as one possible solution but not as the only one.</p>	<p>Airbus proposes that the paragraph 2. b. (4) of Appendix 1 be modified as follows: <i>“(4) If alerts are presented on a limited display area, use an overflow indication to inform the flightcrew that additional alerts may be called up for review. Indications can be used to show the number and urgency levels of the alerts stored in memory.”</i></p>	<p>Like all AC material, this AC is not, in itself, mandatory, and does not constitute a regulation. It describes an acceptable means, but not the only means, for showing compliance with the requirements for transport category airplanes. We will consider other methods of showing compliance that an applicant may elect to present. While these guidelines are not mandatory, we derived them from extensive FAA and industry experience in showing compliance with the relevant regulations.</p> <p>No change was made to this AC in response to this comment.</p>
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<p>AIRBUS Comment #30</p>	<p><u>Paragraph 2. c, page A1-4</u></p> <p>Refer to Airbus comments #8 to #11 about color standardization considerations in paragraphs 11.a.(2), 11.a.(3), 11.b, and 11.(d) of the AC. In addition, note 3 in paragraph 2.c refers to § 25.1322(e), which is not relevant.</p>	<p>As a consequence of those comments, Airbus proposes that paragraph 2.c. of Appendix 1 be modified as follows:</p> <p>About the 2nd bullet, it is proposed to replace the existing text : <i>“• Amber or yellow for caution alerts”</i> by : <i>“• Amber for caution alerts</i></p> <p>About the 3rd bullet, it is proposed to replace the existing text : <i>“• Any color except red, amber, yellow, or green for advisory alerts”</i> by : <i>“• Any color except red for advisory alerts</i></p> <p>About paragraph c.(2), new proposed text : <i>“(3) Amber must be used for indicating non-normal operational or non-normal aircraft system conditions that require immediate flightcrew awareness and less urgent subsequent flightcrew response (compared to a warning alert).”</i></p> <p>About paragraph c.(3), new proposed text : <i>“(3) Advisories may use any color except red for indicating non-normal operational or non-normal system conditions that require flightcrew awareness and may require subsequent flightcrew response.”</i></p> <p>About Note 3, new proposed text : <i>“Note 3: Use of red and amber not related to caution and warning alerting functions must be limited to prevent diminishing the attention-getting characteristics of true warnings and cautions (§ 25.1322(f)). However, it is considered as acceptable:</i> - <i>To use red for failure flags on Primary Flight Display and Navigation Display that may require immediate crew awareness and response;</i> - <i>To use red and amber for Weather display, Terrain hazard and TCAS sector, provided widely spread standards are used.”</i></p>	<p>We will retain the rule language from § 25.1322 in the AC regarding the use of color. The AC includes examples for weather and TAWs. Red flags are part of a visual alert indication for a non-normal condition and addressed in the AC.</p> <p>No change was made to this AC in response to this comment.</p>
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