

Clearance Record
DIVISION COMMENT

Originating Office: AIR-130	Document Description: AC 20-WXR, Airworthiness Approval for Aircraft Weather Radar Systems	Project Lead: Lee Nguyen, 202-385-4651	Reviewing Office: Field	Date of Review: 2/26/2014
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No.	Commenter	Page & Paragraph	Comment	Reason for Comment	Suggested Change	Comment Resolution
1	R.Joslin (CSTA)	Page 2, Para 2-1(b)	The use of color to depict increasing threat does not mention that “yellow” is equivalent to “amber”	Consistency with 14CFR §2X.1322 and AC 25-1322-1	Change “amber” to “amber/yellow”	Accepted. Changed “the progression from green to amber to red represents an increasing degree of threat, ...” to “the progression from green to amber/yellow to red represents an increasing degree of threat,”
2	R. Joslin (CSTA)	Page 2 Para 2-1(b)	Missing FAA Advisory Circular with applicable guidance	AC 25.1302-1 provides guidance on the use of color on displays in Part 25 aircraft	Add the following reference: AC 25.1302-1. Installed Systems and Equipment for Use by the Flight Crew	Accepted. Added AC 25.1302-1, <i>Installed Systems and Equipment for Use by the Flight Crew.</i>
3	R. Joslin (CSTA)	Para 2-1(f)	Editorial-Acronyms for ADS-B and ASDE-X were not spelled out	Editorial-First use of acronyms should be spelled out	Spell out the following: Automatic Dependent Surveillance-Broadcast (ADS-B) Airport Surface Detection Equipment-Model X (ASDE-X)	Accepted Changed as suggested.
4	R. Joslin (CSTA)	Para 2-2(b)(1)	Editorial- 14CFR 25.1322 is listed as an Advisory Circular	Editorial- 14CFR 25.1322 is listed as an Advisory Circular however it is a regulation	Delete 14 CFR 25.1322 in the list of AC’s	Partially accepted. We intend to list 14 CFR § 25.1322. Changed the first sentence in paragraph 2-2(b)(1) to address both regulation and guidance: (1) Ensure the alerts and annunciations follow the flight deck alerting philosophy for the aircraft and adhere to

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						the requirements and guidance in the following regulation and ACs:
5	R. Joslin (CSTA)	Page-3 Para 2-2(b)(2)	Editorial- An altitude of 1200 feet is mentioned without specifying in AGL, MSL, Pressure Altitude, Density Altitude, etc..	Editorial-Need to specify the altitude	Add "AGL" after 1200 feet	Accepted. Added "above ground level (AGL)".
6	R. Joslin (CSTA)	Page-3 Para 2-2(b)(5)	It is not clear what is meant by "...visible to the flight crew"	Annunciations should be visible to the pilot when in the normal seated position on the flight deck. The severity of the annunciation will determine where it should be located in the pilot's field-of-view (optimum primary, primary, secondary, etc.) Ref AC 25-11, AC 25.1322, AC 25.1302, AC 23.1311-1)	Change the sentence to read "...visible to the flight crew <i>from the normal seated position on the flight deck</i> "	Accepted. Changed as suggested.
7	R. Joslin (CSTA)	Page-4 Para 2-2(e)(6)	Editorial- The statement is made that "...does not take more than one action...." Without specifying who is required to take the action	Editorial-Need to specify who is supposed to take the action for manual selection	Change the sentence to read as follows: "...does not take more than one action <i>by the flight crew...</i> "	Accepted. Changed as suggested.

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8	R. Joslin (CSTA)	Page-4 Para 2-3(a)	The statement refers to “wing loading” which is not applicable to rotorcraft	The FAA defines Disk Loading as the total helicopter weight divided by the rotor disk area. (Ref: FAA-H-80883-21A)	Change “wing loading” to “wing loading (disk loading for rotorcraft)”	<p>Not accepted.</p> <p>The aircraft classes by wing loading are based on the correlation between turbulence detection and predicted g-forces for transport and small airplanes covering a range of airplane wing loading; (Ref.: NASA/CR-2009-215769, <i>A Methodology for Determining Statistical Performance Compliance for Airborne Doppler Radar with Forward-Looking Turbulence Detection Capability</i>”). The specified airplane classes by wing loading for turbulence detection performance are not applicable to rotorcraft.</p> <p>Changed paragraph 2-3(a) as:</p> <p>a. TSO-C63d Appendix 1, Table A1 defines three airplane classes. The airplane classes are solely differentiated by wing loading. Ensure the radar is appropriate for the wing loading of the airplane.</p>
9	R. Joslin (CSTA)	Appendix B-1 Para 1	Missing applicable FAA reference documents	Provide complete list of applicable references	<p>Add the following FAA reference documents:</p> <p>AC 25.1302-1-Installed Systems and</p>	<p>Partially accepted.</p> <p>Added AC 25.1302-1.</p>

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					Equipment for Use by the Flightcrew AC 25-12-Airworthiness Criteria for the Approval of Airborne Weather Systems in Transport TSO C-117a- Airborne Windshear Warning Escape Guidance Systems for Transport Airplanes	This draft AC does not address airborne windshear warning systems in transport category airplanes. AC 25-12, <i>Airworthiness Criteria for the Approval of Airborne Windshear Warning Escape Guidance Systems in Transport Category Airplanes</i> , and TSO C-117a are not added to appendix B.
10	R. Joslin (CSTA)	Page-4 Para 2-3(a)	Missing applicable RTCA reference document	Provide complete list of applicable references	Add the following RTCA reference documents: RTCA/DO-173-Minimum Operational Performance Standards for Airborne Weather and Ground Mapping Pulsed Radars RTCA/DO-155- Minimum Operational Performance Standards for Airborne Low-Range Radar Altimeters RTCA/DO-213- Minimum Operational Performance Standards for Nose Mounted Radomes	Not accepted. This draft AC invokes TSO-C63d, which references RTCA/DO-173 and RTCA/DO-213. This AC does not address RTCA/DO-155. The suggested references are not added.
11	AIR-500	Title Page, Header	The incorrect format for the header was used. Refer to the AC template.	There are no boxes used in the header for ACs	Use AC template for header	Accepted. Changed as recommended.
12	AIR-500	Global	No need to have a complicated numbering system with chapters for a short AC.		Remove the 1-1, 1-2, 1-3 format and replace with 1, 2, 3, etc. The entire AC only has 11 or so paragraphs.	Accepted. Changed as recommended.

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13	AIR-500	Title Page, Paragraph 1-1a, last sentence	Incorrect reference format		Rewrite to read: "...to Title 14 of the Code of Federal Regulations, parts 23, 25..."	Accepted. Changed as recommended.
14	AIR-500	Title Page, Paragraph 1-1b, last sentence	Incorrect usage of bold	The bold should not be used for references throughout the document	Remove bold lettering on "Appendix B."	Accepted. Changed as recommended.
15	AIR-500	Title Page, Paragraph 1-1c, first sentence	Remove redundancy	Guidance and information are the same thing	Remove "information."	Accepted. Changed as recommended.
16	AIR-500	Page 2, Paragraph 1-3a, last sentence	"advisory circular" has already been defined		Change "advisory circular" to "AC."	Accepted. Changed as recommended.
17	AIR-500	Page 2, Paragraph 2-1b, last sentence	Clarify that you are referring to the latest revision of the listed ACs. Then you can remove the empty parentheses as well.		Rewrite to read: "...guidance in the latest revision of the following ACs:" Then, delete the parentheses in the 2 nd and 3 rd bullets	Accepted. Changed as recommended.

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18	AIR-500	Global	Do not use bullets in ACs Fix inconsistent punctuation		Replace the bullets with numbers or letters. Add periods at the end of the bullets. Delete the “or”s if not necessary	Partially accepted. Replaced bullets with letters and added periods at the end. Kept "or" since it's necessary to reference the appropriate FAR part AC for each FAR part accordingly.
19	AIR-500	Page 2, Paragraph 2-1b, Bullets	Missing periods	Inconsistent format	Add periods at the end of each bullet line	Accepted. Changed as recommended.
20	AIR-500	Page 2, Paragraph 2-1c	Capitalization not needed		Remove capitalization and rewrite to read: “...ground proximity warning system and traffic alert and collision avoidance system).”	Accepted. Changed as recommended.
21	AIR-500	Page 3, Header	Missing header and footer		Insert date and AC number at the top, like the other pages Insert page number in footer and renumber subsequent pages	Accepted. Changed as recommended.
22	AIR-500	Page 3, Paragraph 2-1f	Define acronyms upon first usage		Define <i>ASDE-X</i> . Define <i>ADS-B</i> .	Accepted. Changed as recommended.
23	AIR-500	Page 3, Paragraph 2-2b(1)	Clarify that you are referring to the latest revision of the listed ACs. Then you can remove the empty parentheses as well.		Rewrite to read: “...guidance in the latest revision of the following ACs:” Then, delete the parentheses and revision letters in the bullets	Accepted. Changed as recommended.

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24	AIR-500	Page 4, Paragraph 2-2b(1), Bullets	Inconsistent format		Italicize the title of AC-27-1B	Accepted. Changed as recommended.
25	AIR-500	Page 4, Paragraph 2-2b(3)	Incorrect usage of bold	The bold should not be used for references throughout the document	Remove bold lettering of references	Accepted. Changed as recommended.
26	AIR-500	Page 4, Paragraphs 2-2c and 2-2d, Titles	Missing period	Inconsistent format	Insert a period at the end of the paragraph titles.	Accepted. Changed as recommended.
27	AIR-500	Page 4, Paragraph 2-2d(1), last sentence	Incorrect capitalization		Change "Part" to "part."	Accepted. Changed as recommended.
28	AIR-500	Page 5, Paragraph 2-2e(2)	Incorrect usage of bold	The bold should not be used for references throughout the document	Remove bold lettering on "Figure 1" and "Appendix A."	Accepted. Changed as recommended.
29	AIR-500	Page 6, Paragraph 3-1	Ensure that the paragraphs referenced in this paragraph are updated after the AC paragraphs are renumbered		Update paragraph numbers.	Accepted. Changed as recommended.

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30	AIR-500	Page 8, Feedback paragraph	Missing feedback narrative and template		Insert AC feedback paragraph and template.	Accepted. Inserted as recommended.
31	AIR-500	Page B-1, Title	Typo		Insert "s" after "Document."	Accepted. Changed as recommended.
32	AIR-500	Page B-1, Note 1	The acronyms for ACs and TSOs have already been defined		Rewrite to read: "The ACs and TSOs referenced in this..."	Accepted. Changed as recommended.
33	AIR-500	Page B-1, Paragraph 1			Remove parenthesis after document numbers. Not necessary due to Note 1.	Accepted. Changed as recommended.
34	AIR-500	Page B-1, Paragraph 1	Labels missing		Label each AC and TSO with a letter.	Accepted. Changed as recommended.
35	AIR-500	Page B-1, Paragraph 2,	Remove redundancy and correct format		Delete "documents" from the title Start the paragraph text immediately after the title, on the same line	Accepted. Changed as recommended.

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36	AIR-500	Page B-2, Paragraph 2b	ACs and TSOs are no longer printed		Delete first sentence Rewrite second sentence to read “You can get copies of ACs and TSOs from our website at...”	Accepted. Changed as recommended.
37	ACE-110		Page numbers are not correct, so these comments pertain to the physical page within the document and not the displayed page number.	Some pages are missing page numbers.		Accepted. Changed as suggested.
38	ACE-110	Pg 1, para 1-1a.	Subject of AC states “...Aircraft Weather Radar Systems”. However, in this paragraph, it is mentioned that the AC also covers “ground mapping pulsed radar systems”.	Contradiction between subject and what is stated in the Purpose.	Either change the subject to “Airworthiness Approval for Aircraft Radar Systems” (or something like that) OR Remove the reference to the ground mapping pulsed radar systems in the Purpose statement.	Not accepted. The draft AC provides guidance for the airworthiness approval of aircraft weather radar systems meeting TSO-C63d, <i>Airborne Weather Radar Equipment</i> . TSO-C63d includes ground mapping pulsed radar functionalities.
39	ACE-110	Page 1, Para 1.2	At least for Part 23, weather radar is non-required safety equipment like AOA systems.	Increased safety at lower cost.	Add field approval and minor change as means of approval if it is only weather radar that does not interface with required systems other than electrical power.	Partially accepted. The draft AC provides guidance for the initial and follow-on installation approval of aircraft weather radar systems. Guidance on field approval can be found in existing Order and advisory materials.

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40	ACE-110	Pg 1, para 1-2	The Audience is stated as “applicants seeking airworthiness approval of aircraft weather radar systems.” What about “ground mapping pulsed radar systems”?	Same reasoning as Comment No. 1	Either add in the ground mapping pulsed systems in this section OR Remove the reference to the ground mapping pulsed radar systems in the Purpose statement.	Not accepted. Paragraph 1a Purpose states the AC provides guidance for the airworthiness approval of aircraft weather radar systems meeting TSO-C63d. TSO-C63d includes ground mapping pulsed radar functionalities. (See resolution to comment 2.)
41	ACE-110	Pg 3, para 2-2a(2)	The forward-looking windshear function should be capable of automatic activation, not that it is automatically ‘capable’.	Inconsistency with 2-2a(1) and also wording is confusing.	Change to read: “...windshear function is capable of automatic activation no later than...”	Accepted. Changed as suggested.
42	ACE-110	Pg 3, para 2-2b(1)	Section mentions the following ‘ACs’ apply, but the first bullet is not an AC.	Inconsistency/confusing	Remove the first bullet “14 CFR 25.1322, Flight Crew Alerting”	Not accepted. We intend to list 14 CFR § 25.1322. Changed the first sentence in paragraph 2-2(b)(1) to address both regulation and guidance: (2) Ensure the alerts and annunciations follow the flight deck alerting philosophy for the aircraft and adhere to the requirements and guidance in the following regulation and ACs:

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43	ACE-110	Pg 3, para 2-2b (1) sub-bullets	Remove the “,or” after each listed AC title.	The word “, or” is not necessary as one or more of the ACs could apply.	Remove the “, or” after each listed AC title.	Accepted.
44	ACE-110	Pg 4, para 2-2b(1) sub-bullet	Sub-bullet for AC 27-1B() should be italicized	Inconsistency	Italicize the title of AC 27-1B(), <i>Certification of Normal Category Rotorcraft</i>	Accepted. Changed as suggested.
46	ACE-110	Pg 4, para 2-2(2)	1200 Feet should be qualified as “AGL”	Inconsistency with para 2-2c(3)	Add “AGL” after 1200 feet.	Accepted. Changed as suggested.
47	ACE-110	Pg 4, para 2-2d(1)	Second sentence uses the word “both” when discussing separate systems.	There could there be more than, so the use of the word ‘both’ is inappropriate	Replace the word “both” with “all” so it reads: “...ensure the alerts do not interfere with one another and all are understandable.”	Accepted. Changed as suggested.
48	ACE-110	Pg 4, para 2-2d(2)	Statement makes it sound like there is a single forward-looking windshear system available	Confusing	Replace the word “the” with “a” so it reads: “If you install a forward-looking windshear...”	Accepted. Changed as suggested.

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49	ACE-110	Pg 5, para 2-2e(4)	Confusing wording at the end of section when discussing the differentiation of the symbology	Confusing	Change the end to read: "...upper edge of the display to help differentiate the windshear symbology."	Accepted Changed as suggested.
50	ACE-110	Pg 5, para 2-2e(7)	This section is all about Windshear and now you introduce "microburst"? Also, the icon cannot have those prescribed sizes. I think it was meant to state the area encompassed by the icon.	Not sure if it was on purpose to put 'microburst' in here or if it was meant to be 'windshear'. Also, size of icon is confusing in way it is stated.	Change "microburst area" to "windshear area". Then change the last sentence to read: "The icon shall encompass an area on the display of no less than 1.8km +- 0.2 km"	Partially accepted Replaced "microburst area" with "windshear area". Deleted statement on icon since that's a design requirement, and it's in DO-220/Change1. The draft AC invokes DO-220/Change1. Deleted paragraph on icon size
51	ACE-110	Page 6 Paragraph 3-1 Test	What is the definition of "each aircraft type airworthiness approval?" I read this as each model or TCDS. If so, why not allow by similarity if applicable.		Clarify what is meant by "each aircraft type airworthiness approval." Change the requirement to test or by similarity for each model.	Partially accepted. Replaced the first sentence in paragraph 7 with: "This section provides guidance for testing radar systems on aircraft." Additional guidance on initial and follow-on installation approvals are addressed in section 7.a for weather detection and ground mapping, section 7.b for forward-looking windshear function, and section 7.c for turbulence detection function.

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52	ACE-110	Pg 6, para 3-1, sub-bullets	Second sub-bullet should include alert prioritization		Change to read: “The radar display, alerts, alert inhibits, alert prioritization, annunciations...”	Accepted. Changed as suggested.
53	ACE-110	Pg 6, para 3-2, sub-bullets	Remove the “,or” after each listed AC title.	The word “, or” is not necessary as one or more of the ACs could apply.	Remove the “, or” after each listed AC title.	Accepted.
54	ACE-110	A-1, Appendix A, Table 1, Visual Alert, Level II and Level III	Editorial, missing a quotation	Editorial	Add a quotation before “W/S Ahead” in both cells.	Accepted. Changed as suggested.
55	Tony Pigott, ANE-150	All	When referencing TSO-C63d it should reference TSO-C63d or later revision.	Keep the AC applicable when the new revisions of the TSO are released.	See comment.	Accepted. Changed as suggested.
56	Tony Pigott, ANE-150	2-2e	There should be requirements for the overlay of radar data on moving maps and presentation with other situational awareness data.	Need guidance on what is acceptable for display of radar data on moving maps with other situational awareness data.		Not accepted. Guidance for overlay of radar information on moving maps is covered in the AC’s referenced in paragraph 4.b of the AC. (AC 25-11(), AC 23.1311-1, AC 27-1 and AC 29-2)

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57	D. Dunford, ANM-111	Pg. 2, para 2-1b.	The reference to AC 25-11 is incorrect.	The revised AC 25-11 has been designated Rev B and the Weather Displays appendix is G.	Change AC 25-11A, Change 1, <i>Electronic Flight Deck Displays</i> , Appendix 7 To AC 25-11B, <i>Electronic Flight Displays</i> , Appendix G <i>Weather Displays</i>	Accepted. Changed as suggested.
58	D. Dunford, ANM-111	Pg. 2, para 2-1b.	The paragraph singles out the color progression from green to amber to red as if it is the only issue for referring to the referenced ACs. For Part 25 weather radar installations, the applicant should use AC 25-11B as the primary means of compliance for electronic weather displays.	See comment.	Perhaps, paragraph 2. Should have a general statement that for Part 25 installations of weather radar, the applicant should follow the guidance of AC 25-11B <i>Electronic Flight Displays</i> .	Not accepted. This paragraph addresses color display. The following statement in paragraph 4.b(1) addresses the intent of the comment: “Reference the latest revisions of AC 25-11 for part 25 transport category aircraft.”
59	D. Dunford, ANM-111	Page after Pg. 2	Pages are miss-numbered. The page after page 2 is blank it does not have a page number. The page following the blank page	See comment.	Add page number to the page after page 2	Accepted.

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			is labeled page 3.			
60	D. Dunford, ANM-111	Page after Pg. 2, para 2-2.b.	AC 25-11B, <i>Electronic Flight Displays</i> is missing from the list of ACs.	See comment.	Add AC 25-11B, <i>Electronic Flight Displays</i> to the list of ACs.	Accepted. Changed as suggested.
61	ANM160L	Section 3-2 Weather Radar, page 5	The cited ACs contain specific versions. They should be kept generic otherwise this AC will have to be revised when the referenced ACs are revised. For example, AC 25-7C is referenced but AC 25-7D is already out for comments and maybe released before this AC.	To prevent having to revise AC.	The cited ACs should contain generic versions or revision or later.	Accepted. Changed as suggested.
62	D. Dunford, ANM-111	Pg. B-1, para 1.	The title for AC 25-11() is incorrect.	See comment.	Change title of AC 25-11() to <i>Electronic Flight Displays</i>	Adopted. Changed as suggested.