

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
Garmin	6.a	Should add a reference to:  AC 20-155  Lightning Protection Certification		Add reference	Adopted.
Garmin	6.d(5)	States in part:  5. <b>American Society for Testing and Materials (ASTM).</b> American Society for Testing and Materials (ASTM) Manual 36, "Safe Use of Oxygen and Oxygen Systems,  Guidelines for Oxygen System Design, Materials Selection, Operations, Storage, and Transportation," dated 2000, may be purchased from the ASTM, 100 Barr Harbor Drive, Post Office Box C700, West Conshohocken, PA 19428-2959.		Some carriage returns need to be removed so that the text that begins with "Guidelines for Oxygen ..." abuts the text that ends with "Oxygen and Oxygen Systems,"	Adopted.
Garmin	General comment on 23.xxx guidance	Many times the 23.xxx guidance contains quotes from the NPRM and/or final rule background information related to a specific regulatory amendment. However, there is no explanation for the convention used in quoting that background information. It appears that italicized text is close to the words used in the NPRM but not exactly		Explain the conventions for quoting NPRM/final rule background information (and other quoted information like policy memos, etc.).	Adopted. Added to Paragraph 1: "Preamble materials are excerpts from NPRMs and final rules. The relevant NPRMs and final rules are the official sources."

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Garmin (Continued)	General comment on 23.xxx guidance (Continued)	(perhaps these are the changes from the NPRM to the final rule). It would be good if the AC included an explanation about what these conventions are prior to any of the 23.xxx guidance.			
Garmin	23.673	States in part:  No policy available as of December 31, 2007.  Should “2007” be “2008” or “2009”? This comment applies to all such statements throughout this AC.		Consider whether the date should be changed in all such statements throughout the AC.	Not Adopted. Policy adopted after December 31, 2007 will be included in a future revision of this AC.
Garmin	23.677	States in part:  The FAA has accepted demonstration of control-restrained trim runaways during malfunction testing for systems without a monitor/limiter regardless of the reliability and those with a monitor/limiter whose reliability is less than unlikely. However, the FAA has determined this procedure is not acceptable in itself for failure conditions shown to be less than unlikely.  The phrase “less than unlikely” is used in the context of reliability and failure conditions, but “unlikely” is not one of the recognized 23.1309		Change the phrase “less than unlikely” to be consistent with one of the recognized 23.1309 qualitative probability terms (two instances).	Adopted. Changed to probable and major.

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Garmin (Continued)	23.677 (Continued)	qualitative probabilities of “probable”, “remote”, “extremely remote” and “extremely improbable”.			
Garmin	23.785	<p>States in part:</p> <p>Order 8300.10, “Airworthiness Inspectors Handbook,” Change 21, February 23, 2005.</p> <p>Order 8300.10 has been cancelled and incorporated into Order 8900.1, Flight Standards Information Management System (FSMIS).</p>		Suggest updating the reference or possibly deleting the reference as it does not appear to be used anywhere in AC 23-17C.	Adopted. Deleted the reference.
Garmin	23.785	<p>States in part:</p> <p>FAA Notice 8110.69, dated June 30, 1997, requires ...</p>		Should update the text to reference Order 8110.4	Adopted.
Garmin	23.785	<p>States in part:</p> <p>The test load should be 814 pounds for normal category or 910 pounds for utility or acrobatic category, in accordance with AC 23-4. Reference 4, ...</p> <p>AC 23-4 doesn’t appear in the FAA RGL in either the current or historical list of ACs.</p> <p>Additionally, it is not clear what “Reference 4” is referring to in this context. Reference 4 within AC 23-4? Reference 4 in AC 23-17C? Or in some other document?</p>		<p>Change the “AC 23-4” text to the correct reference.</p> <p>Clarify “Reference 4” as necessary.</p>	Adopted. Reference 4, AC 23-4, is deleted and References 1, 2 and 3 read “in this section” for clarification.

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Garmin	23.1301	<p>States in part:</p> <p>For systems that have a catastrophic failure condition, testing for HIRF is required through special conditions.</p> <p>The HIRF special conditions have been superseded by § 23.1308.</p>		Revise the text to reference § 23.1308 rather than mentioning “special conditions”.	Adopted. Changed sentence to: “For systems that have a catastrophic failure condition, testing for HIRF is required.”
Garmin	23.1301	<p>States in part:</p> <p>Although, the FAA would still accept qualitative evaluations for the specific airplane, but it may be more efficient to address the environmental requirements by complying with the appropriate sections and levels of RTCA/DO-160.</p>		Delete the word “but” from the phrase “specific airplane, but it may be”.	Adopted.
Garmin	23.1301	<p>States in part:</p> <p>The installer is required to verify the intended function and make any placards or flight manual limitations per Subpart G the installed equipment makes necessary.</p> <p>The intent of this sentence is unclear.</p>		Reword the sentence to make the intent clear.	Adopted. Changed the sentence to: “The installer is required to verify the intended function and make any placards or flight manual limitations for the installed equipment per Subpart G as necessary.”
Garmin	23.1301	<p>States in part:</p> <p>There has been a trend to install equipment mainly navigation related such as moving maps, as non-required,</p>		<p>Reword the sentence to make the intent clear.</p> <p>For starters, suggest inserting a comma between “equipment” and “mainly” but that doesn’t address all of the issues with the lack of clarity.</p>	Adopted. Changed sentence to “There has been a trend for applicants to install equipment, mainly navigation related such as

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Garmin (Continued)	23.1301 (Continued)	<p>“Not approved for primary navigation” or “Situation Awareness Only (SA-Only).”</p> <p>Is this sentence trying to say how such equipment should be labeled? Does labeling such equipment with either of the two quoted phrases make the equipment non-required? Or is that another label?</p>			moving maps, labeled as non-required, “Not approved for primary navigation” or “Situation Awareness Only (SA-Only).”
Garmin	23.1301	<p>States in part:</p> <p>The Discussion of the Regulatory Amendments stated: The ARC did not make specific recommendations regarding § 23.1301.</p>		Clarify that “ARC” means “Aviation Rulemaking Committee”.	Adopted. Changed to “Aviation Rulemaking Committee (ARC).”
Garmin	23.1301	<p>States in part:</p> <p>The FAA expect applicants to coordinate or negotiate deviations from established means of compliance with the Administrator as early as possible to minimize delay to program schedules.</p>		Change “expect” to “expects”.	Adopted.
Garmin	23.1305	<p>States in part:</p> <p>A copy of the advisory circular is available on the Internet at <a href="http://www.faa.gov/regulations_policies/">http://www.faa.gov/regulations_policies/</a>.</p> <p>Such statements haven’t been made for other AC references. Additionally, this statement runs the risk of becoming quickly obsolete.</p>		Suggest deleting this text as AC 23-17C sections 6.a and 6.b provide information about how to obtain FAA advisory circulars.	Adopted.

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Garmin	23.1305	<p>States in part:</p> <p>... The proposed rule changes to §§ 23.1303, 23.1305, and 23.1311 would largely eliminate the need to issue ELOS findings for these systems and help standardize certification of new technology.</p> <p>The proposed rule changes to §§ 23.1305 and 23.1311 will largely eliminate the need to issue equivalent level of safety findings for these systems and help standardize certification of new technology.</p> <p>These sentences are nearly identical except for the omission of 23.1303 from the second sentence.</p>		Merge into a single sentence with correct information.	Partially Adopted. Deleted the paragraphs.
Garmin	23.1307	<p>States in part:</p> <p>The Discussion of the Regulatory Amendments stated: The ARC also did not make a specific recommendation for § 23.1307.</p>		Delete the word also from the phrase “The ARC also did not”.	Partially Adopted. Deleted the paragraph.
Garmin	23.1308	<p>States in part:</p> <p><i>(6) The adverse effects experienced by some aircraft when exposed to HIRF.</i></p> <p>There are segments of the aviation community that have never heard that</p>		Suggest citing some known cases to assist with educating the aviation community.	Not Adopted. The NPRM includes examples cited in the next paragraph.

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Garmin (Continued)	23.1308 (Continued)	HIRF has ever had an adverse effect and question the need for HIRF testing.			
Garmin	23.1308	<p>States in part:</p> <p><i>It requires each electrical and electronic system that performs a function whose failure would significantly reduce the capability of the aircraft or the ability of the flightcrew to respond to an adverse operating condition to be designed and installed such that it is not affected adversely when the equipment providing the function is exposed to equipment HIRF test level 1 or 2.</i></p> <p>The phrase “whose failure would significantly reduce” implies a major failure condition (as defined in AC 23.1309-1D/1E paragraph 8.v(3)). However, in this context, “adverse operating condition” is intended to be applied to functions with a hazardous failure condition (as defined in AC 23.1309-1D/1E paragraph 8.v.(4)) and not to functions that have a major failure condition.</p>		Clarify the text so that required HIRF test levels are applied to the proper failure condition.	Not Adopted. This is preamble.
Garmin	23.1308	<p>States in part:</p> <p><i>Additionally, the final rule requires each electrical and electronic system that</i></p>		Clarify the text so that required HIRF test levels are applied to the proper failure condition.	Not Adopted. This is preamble.

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Garmin (Continued)	23.1308 (Continued)	<p><i>performs a function whose failure would reduce (but not significantly) the capability of the aircraft or the ability of the flightcrew to respond to an adverse operating condition to be designed and installed such that it is not affected adversely when the equipment providing these functions is exposed to equipment HIRF test level 3.</i></p> <p>The phrase “whose failure would reduce (but not significantly)” implies a minor failure condition (as defined in AC 23.1309-1D/1E paragraph 8.v.(2)). However, in this context, “adverse operating condition” is intended to be applied to functions with a major failure condition (as defined in AC 23.1309-1D/1E paragraph 8.v.(3)) and not to functions that have a minor failure condition.</p>			
Garmin	23.1309	<p>States in part:</p> <p>EASA requires applicants to use the EUROCAE documents that are technically identical to this ARP(s) listed.</p>		Change the word “this” to “the” in the phrase “this ARP(s) listed.”	Adopted.
Garmin	23.1309	<p>States in part:</p> <p><b>Amendment 23-60 and Subsequent</b></p> <p>The Discussion of the</p>		To be consistent with other sections, the word “stated” should be followed by a colon, not a period.	Not Adopted. The paragraph has been deleted.

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Garmin (Continued)	23.1309 (Continued)	Regulatory Amendments stated.			
Garmin	23.1309	States in part:  This revision would address electronic engine controls and eliminate the need for special conditions to apply § 23.1309 to electronic engine control systems		Add period at end of sentence.	Not Adopted. The paragraph has been deleted.
Garmin	23.1309	States in part:  The FAA clarify the certification requirements, environmental qualification test requirements, and our intent for determining proper “intended function” of non-required systems and equipment that do not have a safety effect on the airplane.		Change “clarify” to “clarified”.	Not Adopted. The paragraph has been deleted.
Garmin	23.1309	States in part:  A problem with the current requirements for airplane manufacturers arises when certification authorities question installation of non-required systems and equipment that do not perform following their specifications and, therefore, are “not functioning properly when installed.”  Does this sentence mean the non-required equipment is “not turned on” or is “not performing			Not Adopted. The paragraph has been deleted.

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Garmin (Continued)	23.1309 (Continued)	its intended function because it hasn't been asked to do so" or is "not performing its intended function due to a failure"?		Clarify the intent of this sentence.	
Garmin	23.1309	<p>States in part:</p> <p>System lightning protection specifically allows the loss of function and capability of some electrical/electronic systems when the airplane is exposed to lightning, if "these functions can be recovered in a timely manner."</p> <p>Garmin suggests the following clarifying text in lieu of the quoted draft text:</p> <p>System cable bundle lightning testing, designed to evaluate functional upset during a lightning strike, specifically allows the functionality and capabilities of some electrical/electronic systems to be lost when the airplane is exposed to lightning, provided that "these functions can be recovered in a timely manner." Given the short duration of the lightning strike, momentary upsets may be tolerated if the automatic recovery time is of a duration that does not lead to an</p>		Revise the paragraph as suggested.	Not Adopted. The paragraph has been deleted.

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Garmin (Continued)	23.1309 (Continued)	<p>adverse effect for systems with major, hazardous or catastrophic failure condition(s). It also allows permanent loss of functions at higher test levels associated with higher certification levels (as defined by AC 20-158 and AC 20-136A) than what is required. As an example, a system may have certain functions classified as having major failure conditions (AC 20-158 and AC 20-136A Certification Level C) while other functions are classified as having catastrophic failure conditions (AC 20-158 and AC 20-136A Certification Level A). In this case, when the system is tested to test levels associated with catastrophic failure conditions it is acceptable to for the test to result in a permanent loss of a function that has a major failure condition but it is not acceptable for the test to result in a catastrophic failure condition. However, no major or catastrophic failure conditions are acceptable when the system is tested to test levels associated with major failure conditions.</p>			

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Garmin	23.1309	<p>States in part:</p> <p>For example, it is not acceptable for an integrated avionics system to be approved until known functional defects in required functions are corrected.</p> <p>This statement isn't entirely true. An avionics system can be approved and still have known defects (e.g., software open problem reports) in required functions as long as the defects do not rise to the level that they are deemed not certifiable. However, functional defects that are deemed not certifiable would have to be corrected prior to obtaining approval.</p>		Adjust this sentence to be accurate.	Not Adopted. The paragraph has been deleted.
Garmin	23.1309	<p>States in part:</p> <p>... (e.g., the Requirements and Technical Concepts for Aviation (RTCA) ...</p> <p>RTCA no longer uses this title. It is now known as RTCA, Inc.</p>		Change "Requirements and Technical Concepts for Aviation (RTCA)" to "RTCA, Inc."	Not Adopted. The paragraph has been deleted.
Garmin	23.1309	<p>States in part:</p> <p>This means of compliance identifies four classes of airplanes as defined in Appendix K of this proposal and applies appropriate probability values and development assurance levels for each class.</p>		<p>The § 23 Appendix K guidance should remain in AC 23.1309, but be removed from proposed Part 23.1309.</p> <p>Adjust this text as necessary.</p>	Not Adopted. The paragraph has been deleted.

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Garmin (Continued)	23.1309 (Continued)	NPRM § 23.1309 and Appendix K proposes to codify of the long established means of compliance used for § 23.1309. As submitted with the § 23 NPRM, Garmin is strongly opposed to codifying the means of compliance as development assurance is one means but not the only means of compliance for software and complex hardware to meet the rule. Furthermore, codifying the means of compliance significantly detracts from the ease of change allowed by leaving the means of compliance in AC 23.1309.			
Garmin	23.1309	States in part:  The FAA added Appendix K to show the appropriate airplane systems probability standards, failure conditions, and related development assurance for four certification classes of airplanes designed to part 23 standards. The Appendix K development assurance levels correlate to the software levels in RTCA/DO-178B and the complex design assurance levels in RTCA/DO-254. The FAA provided quantitative values in Appendix K to indicate the order of probability range for each		The § 23 Appendix K guidance should remain in AC 23.1309, but be removed from proposed Part 23.1309.  Adjust this text as necessary.	Not Adopted. The paragraph has been deleted.

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Garmin (Continued)	23.1309 (Continued)	<p>certification class and failure condition.</p> <p>As used in § 23.1309, the FAA's intended definitions for terms used in Appendix K:</p> <p><u>Allowable Qualitative Failure Condition Probabilities</u></p> <p>a. <u>Extremely remote failure conditions:</u> Those failure conditions not anticipated to occur to each airplane during its total life but may occur a few times when considering the total Operational life of all airplanes of this type. For quantitative assessments, refer to the probability values shown for hazardous failure conditions in Appendix K.</p> <p>b. <u>Extremely improbable failure conditions:</u> For commuter category airplanes, those failure conditions so unlikely that they are not anticipated to occur during the entire operational life of all airplanes of one type. For other classes of airplanes, the likelihood of occurrence may be greater. For quantitative</p>			

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Garmin (Continued)	23.1309 (Continued)	<p>assessments, refer to the probability values shown for catastrophic failure conditions in Appendix K.</p> <p>c. <u>Probable failure conditions</u>: Those failure conditions anticipated to occur one or more times during the entire operational life of each airplane. These failure conditions may be determined on the basis of past service experience with similar components in comparable airplane applications. For quantitative assessments, refer to the probability values shown for minor failure conditions in Appendix K.</p> <p>d. <u>Remote failure conditions</u>: Those failure conditions that are unlikely to occur to each airplane during its total life but may occur several times when considering the total operational life of a number of airplanes of this type. For quantitative assessments, refer to the probability values shown for major failure conditions in Appendix K.</p> <p>NPRM § 23.1309 and Appendix K proposes</p>			

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Garmin (Continued)	23.1309 (Continued)	to codify of the long established means of compliance used for § 23.1309. As submitted with the § 23 NPRM, Garmin is strongly opposed to codifying the means of compliance as development assurance is one means but not the only means of compliance for software and complex hardware to meet the rule. Furthermore, codifying the means of compliance significantly detracts from the ease of change allowed by leaving the means of compliance in AC 23.1309.			
Garmin	23.1309	<p>States in part:</p> <p>e. <u>Design appraisal</u>: A qualitative appraisal of the integrity and safety of the system design. An effective appraisal requires experienced judgment.</p> <p>Garmin is strongly opposed to codifying the means of compliance as development assurance is one means but not the only means of compliance for software and complex hardware to meet the rule.</p> <p>Additionally, § 23 Appendix K makes no reference to the term “design appraisal”.</p>		<p>The § 23 Appendix K guidance should remain in AC 23.1309, but be removed from proposed Part 23.1309.</p> <p>Additionally, delete this text as it is not referenced in § 23 Appendix K.</p>	Not Adopted. The paragraph has been deleted.

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Garmin	23.1309	<p>States in part:</p> <p>f. <u>Development assurance level</u>: All planned and systematic actions used to substantiate, to an adequate level of confidence, that errors in requirements, design, and implementation have been identified and corrected such that the system satisfies the applicable certification basis. (The development assurance levels in Appendix K are intended to correlate to software levels in RTCA/DO-178B and complex hardware design assurance levels in RTCA/DO-254 for the system or item.)</p> <p>NPRM § 23.1309 and Appendix K proposes to codify of the long established means of compliance used for § 23.1309. As submitted with the § 23 NPRM, Garmin is strongly opposed to codifying the means of compliance as development assurance is one means but not the only means of compliance for software and complex hardware to meet the rule. Furthermore, codifying the means of compliance significantly detracts from the ease of change allowed by leaving the means of</p>		<p>The § 23 Appendix K guidance should remain in AC 23.1309, but be removed from proposed Part 23.1309.</p> <p>Adjust this text as necessary.</p>	<p>Not Adopted. The paragraph has been deleted.</p>

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Garmin (Continued)	23.1309 (Continued)	compliance in AC 23.1309.			
Garmin	23.1309	<p>States in part:</p> <p>... Simple systems do not contain software or complex hardware requiring compliance by documents. ...</p> <p>Garmin disagrees that a simple and conventional system cannot have software or complex electronic devices. The implication of making this statement is that essentially all avionics assessed as having a Major failure classification will require quantitative analysis for § 23.1309 compliance even if the non-SW/CEH aspects of the system are simple and possibly even redundant. The SW and CEH aspects are covered by the development assurance requirements of DO-178B and DO-254, respectively. There is no reason to require quantitative analysis of an otherwise simple and possibly redundant system just because it has SW/CEH when the SW/CEH aspects aren't considered in the quantitative analysis anyway. If the system is non-traditional or complex in itself then quantitative analysis should be required but the inclusion of SW or a CEH device shouldn't be the limiting</p>		Delete this statement.	Not Adopted. The paragraph has been deleted.

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Garmin (Continued)	23.1309 (Continued)	factor.			
Garmin	23.1309	States in part:  Any procedures for the flight crew to follow after the occurrence of a failure indication or annunciation would be described in the approved Airplane Flight Manual (AFM), AFM revision, or AFM supplement, unless they are accepted as part of normal aviation abilities.  The phrase “normal aviation abilities” does not seem to convey the intent of this sentence.		Suggest changing the phrase “normal aviation abilities” to “normal aviation operational conventions” or “conventional aviation procedures”.	Not Adopted. The paragraph has been deleted.
Garmin	23.1309	States in part:  <i>Previous</i> § 23.1309 (c) and (d) are not directly related to the other safety and analysis requirements of § 23.1309.		Remove italics from the word “Previous”.	Not Adopted. The paragraph has been deleted.
Garmin	23.1309	States in part:  <i>Previous</i> § 23.1309 (c) and (d) are not directly related to the other safety and analysis requirements of § 23.1309.		Remove italics from the word “Previous”.	Not Adopted. The paragraph has been deleted.
Garmin	23.1311	States in part:  ... <i>In</i> § 23.1311(a)(5), ...		Insert space between “In” and “§”.	Not Adopted. The paragraph has been deleted.
Garmin	23.1311	States in part:  In § 23.1311(b), we replace the phrase “remain available to the crew, without need		As submitted with the § 23 NPRM, suggest changing the word “with” in the phrase “be available within one second to the crew with a single pilot action or by automatic means” should be changed to “through” or “by” so that the phrase reads:	Not Adopted. The paragraph has been deleted.

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Garmin (Continued)	23.1311 (Continued)	for immediate action” with “be available within one second to the crew with a single pilot action or by automatic means.”		“be available within one second to the crew through a single pilot action or by automatic means”  or:  “be available within one second to the crew by a single pilot action or by automatic means”	
Garmin	23.1311	States in part:  There are three acceptable methods for meeting the requirements of § 23.1311(b)—(1) dedicated standby instruments, (2) dual primary flight displays (PFDs), or (3) reversionary displays that display independent attitude.		To be consistent with the NPRM § 23.1311(b), the word “attitude” in this sentence should be changed to the phrase “information essential for continued safe flight and landing”.	Not Adopted. The paragraph has been deleted.
Garmin	23.1311	States in part:  Malfunctions that result in automatic switching would be extensive enough to ensure PFI is available at the reliability level required by § 23.1309.  The intent of this sentence is unclear. What is meant by the phrase “would be extensive enough to ensure PFI is available”?		Reword the sentence to make the intent clear.	Not Adopted. The paragraph has been deleted.
Garmin	23.1311	States in part:  ... All modes, sources, frequencies, and flight plan data should be exactly as they were on the PFD before the failure  Are “All modes, sources,		Adjust this text as necessary.  Additionally, add period at end of sentence.	Not Adopted. The paragraph has been deleted.

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Garmin (Continued)	23.1311 (Continued)	frequencies, and flight plan data” really considered “information essential for continued safe flight and landing” per NPRM § 23.1311(b)?			
Garmin	23.1311	States in part:  Manual activation of the reversionary mode on the MFD through single action by the pilot would be acceptable when procedures to activate the PFI are accomplished before entering critical phases of flight.		Change the phrase “activate the PFI” to “activate the PFI on the MFD”.	Not Adopted. The paragraph has been deleted.
Garmin	23.1331	States in part:  3. Different types of power, electrical and vacuum, are installed for primary and secondary instruments.		Delete extra blank space between “vacuum,” and “are”.	Not Adopted. The paragraph has been deleted.
Garmin	23.1326	States in part:  4. The eligibility of other IFR approved airplanes, including those with the service ceilings below 18,000 feet, is determined jointly by the ACOs and the Small Airplane Standards Office.		Change “Small Airplane Standards” to “Small Airplane Directorate”.	Adopted.
Garmin	23.1353	States in part:  The battery for the 30-minute criteria, therefore, should be an independent power source from the airplanes starter		Change “airplanes” to “airplane’s” (possessive) in two instances.  Remove boldface from the phrase “may, with FAA approval, be”.	Partially Adopted. Bold face remains.

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Garmin (Continued)	23.1353 (Continued)	battery. If adequate monitoring and procedures are incorporated so the pilot knows the airplanes starter battery meets the 30-minute criteria after an engine start and during all other operations, an ELOS finding <b>may, with FAA approval, be</b> an acceptable method for using the airplanes starter battery.			
Garmin	23.1353	States in part:  The FAA did not envision integrated, electric cockpits when we developed § 23.1353(h).		Adjust § symbol so that the section symbol and 23.1353(h) are on the same line as in other references (can cut-and-paste another use of the special Word § symbol from the preceding paragraph).	Adopted.
Garmin	23.1357	States in part:  2. For airplane systems with a certification basis at Amendment 23-41 or later: When the failure condition of the loss of the function is determined to be “major,” “hazardous,” or “catastrophic” [according to § 23.1309 and AC 1309-1D safety assessment, which also considers operational and airworthiness requirements], it has a significant impact on safety		Change “AC 1309-1D” to “AC 23.1309-1E”.	Adopted.

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Garmin (Continued)	23.1357 (Continued)	in flight and is considered “essential to safety in flight.”			
Garmin	23.1357	States in part:  ** According to § 23.1309 and AC 1309-1D safety assessment, which also considers operational and airworthiness requirements.		Change “AC 1309-1D” to “AC 23.1309-1E”.	Adopted.
Garmin	23.1357	States in part:  In this situation, all the correct environmental test conditions, such as indirect effects of lightning and High Intensity Radiated Fields (HIRF) standards, should be addressed for installation.  It is unclear why a fuse located internally requires mention of “correct environmental test conditions, etc.” versus a fuse located externally as this would seem appropriate for both locations.		Suggest removing this sentence.	Partially Adopted. Deleted “internal” from the preceding sentence so it applies to all C/Bs and fuses that are out of reach.
Garmin	23.1443	States in part:  The Discussion of the Regulatory Amendments stated:Currently we address oxygen		Insert space between “stated:” and “Currently”.	Adopted.
Garmin	23.1445	States in part:  The Discussion of the Regulatory Amendments stated: stated:Currently we address oxygen		Delete repeated phrase “stated:”	Adopted.

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Garmin	23.1457	States in part:  <i>... and if data-link communication equipment is installed, require that all data-link communications received on an aircraft be recorded. ...</i>		Delete the space between “data-” and “link” in the second instance of “data-link”.	Partially Adopted. Changed all to datalink for consistency.
Garmin	23.1457	States in part:  <i>... Current regulations require that 15 minutes to 30 minutes of cockpit voice communication be recorded and do not specify the recording medium. The new operating requirements are proposed in Sec. Sec. 91.609(i)(2), 121.359(i)(2), 125.227(g)(2), and 135.151(f)(2).</i>		Delete repeated instance of “Sec.” from the phrase “proposed in Sec. Sec. 91.609(i)(2)”	Adopted. Deleted in multiple places.
Garmin	23.1457	States in part:  <i>Proposed Sec. Sec. 91.609(j), 121.359(j), 125.227(h), and 135.151(g) would include the requirement for all newly manufactured airplanes or rotorcraft that are required to have a cockpit voice recorder and a flight data recorder, and that have data-link communication equipment installed, to record the data-link communication in accordance with the proposed changes to the certification rules.</i>		Delete repeated instance of “Sec.” from the phrases:  <ul style="list-style-type: none"> <li>• “Sec. Sec. 91.609(j),”</li> <li>• “Sec. Sec. 23.1457(a)(6),”</li> <li>• “Sec. Sec. 91.609(k)”</li> </ul> Delete the space between “data-” and “link” in the last instance of “data-link”.	Adopted. Deleted in multiple places.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
Garmin (Continued)	23.1457 (Continued)	<p><i>These proposed changes are found in Sec. Sec. 23.1457(a)(6), 25.1457(a)(6), 27.1457(a)(6), and 29.1457(a)(6).</i></p> <p>In addition, proposed Sec. Sec. 91.609(k), 121.359(k), 125.227(i), and 135.151(h) would include the proposed requirement that if data-link communication equipment is installed on any aircraft 2 years after the effective date of the final rule, those aircraft must record all data-link communications in accordance with the proposed certification rule as of the time of equipment installation.”</p>			
Garmin	23.1457	<p>States in part:</p> <p>a. Is installed in accordance with the requirements of Sec. 23.1457.</p>		Remove boldface from the letter “I” in the word “Is”.	Adopted.
GAMA	General	Frequently the draft guidance contains quotes from the NPRM and/or final rule background information related to a specific regulatory amendment. However, there is no explanation for the convention used in quoting that background information. It appears that italicized text is close to the words used in the NPRM but not exactly		It would be beneficial if the AC included an explanation about what these conventions are and how they have been incorporated in preamble material of the guidance	Adopted. Added to Paragraph 1: “Preamble materials are excerpts from NPRMs and final rules. The relevant NPRMs and final rules are the official sources.”

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	General (Continued)	(perhaps these are the changes from the NPRM to the final rule).			
GAMA	Section 6.a			GAMA suggests the FAA include AC 20-155, <i>SAE Documents to Support Aircraft Lightning Protection Certification</i> in the list of references	Adopted.
GAMA	Section 6.d.(5)			GAMA recommends the FAA review the reference to ASTM manual 36 as it appears the title of this document has been broken between "...Oxygen and Oxygen Systems," and "...Guidelines for Oxygen..." by extra carriage returns.	Adopted.
GAMA	Section 7, 23.673 (page 11)	This section states: "No policy available as of December 31, 2007."		GAMA suggests the FAA update this and all other "No policy available..." references through out the document to reflect the new publishing date of this guidance revision.	Not Adopted. Policy adopted after December 31, 2007 will be included in a future revision of this AC.
GAMA	Section 7, 23.677(page 14)	This section states in part:  The FAA has accepted demonstration of control-restrained trim runaways during malfunction testing for systems without a monitor/limiter regardless of the reliability and those with a monitor/limiter whose reliability is less than unlikely.  However, the FAA has determined this procedure is not acceptable in itself for failure conditions shown to be less than unlikely.	The phrase "less than unlikely" is used in the context of reliability and failure conditions, "unlikely" is not one of the recognized §23 qualitative probabilities of "probable", "remote", "extremely remote" and "extremely improbable".	GAMA recommends the FAA change the phrase "less than unlikely" to be consistent with one of the recognized 23.1309 qualitative probability terms (note, there are two instances of this phrase).	Adopted.
GAMA	Section 7, 23.785 (page 101)	This section makes reference to Order 8300.10, <i>Airworthiness Inspectors Handbook</i> , Change 21, February 23, 2005. This order has been cancelled and incorporated		GAMA recommends the FAA update this reference.	Partially Adopted. Changed reference to Order 8110.4.

<b>Company or Group</b>	<b>Page and Paragraph</b>	<b>Comment</b>	<b>Rationale</b>	<b>Recommendation</b>	<b>Disposition</b>
GAMA (Continued)	Section 7, 23.785 (page 101) (Continued)	into FAA Order 8900.1, <i>Flight Standards Information Management System (FSMIS)</i> .			
GAMA	Section 7, 23.785 (page 101)	This section includes “Technical Standard Order C-22g, ‘Safety Belts,’ March 5, 1993		.” GAMA suggests the FAA include the abbreviation “(TSO)” in this reference so the format matches that of the above reference for TSO-C114.	Adopted.
GAMA	Section 7, 23.785 (page 104) –	The FAA makes reference to Order 8110.69 in this section. This order has been cancelled and incorporated into Order 8110.4. .		GAMA recommends the FAA update this reference	Adopted.
GAMA	Section 7, 23.785 (page 105)	This section makes reference to “AC 23-4. Reference 4, Chapter 1, Perform Field Approval of Major Repairs and Major Alterations, Section 1, paragraph 5D(2)” GAMA is unaware of an existing or past AC 23-4 and Reference 4.		GAMA requests this text be updated and a clear reference be added.	Partially Adopted. The reference is deleted.
GAMA	Section 7, 23.1301 (page 168) –	This section states “For systems that have a catastrophic failure condition, testing for HIRF is required through special conditions.” The HIRF special conditions have been superseded by § 23.1308.		GAMA recommends the FAA include reference to §23.1309 in place of special conditions.	Partially Adopted. Deleted “through special conditions.”
GAMA	Section 7, 23.1301 (page 169)	This section states “Although, the FAA would still accept qualitative evaluations for the specific airplane, but it may be more efficient to address the environmental requirements by complying with the appropriate sections and levels of RTCA/DO-160.”		GAMA recommends the FAA delete the word “but” from the phrase “specific airplane, but it may be...”	Adopted.

<b>Company or Group</b>	<b>Page and Paragraph</b>	<b>Comment</b>	<b>Rationale</b>	<b>Recommendation</b>	<b>Disposition</b>
GAMA	Section 7, 23.1301 (page 172)	This section states “The installer is required to verify the intended function and make any placards or flight manual limitations per Subpart G the installed equipment makes necessary.”		GAMA is unsure of the intent of this sentence, please clarify.	Adopted. Changed the sentence to: “The installer is required to verify the intended function and make any placards or flight manual limitations for the installed equipment per Subpart G as necessary.”
GAMA	Section 7, 23.1301 (page 172)	This section states “There has been a trend to install equipment mainly navigation related such as moving maps, as non-required, “Not approved for primary navigation” or “Situation Awareness Only (SA-Only).”		GAMA is unsure of the intent of this sentence. If the intent is to point out an increase in cockpit equipment which is non-required, clarification is necessary. GAMA is unsure why the quoted text, commonly used placard language, is used in this sentence.	Adopted. Changed sentence to “There has been a trend for applicants to install equipment, mainly navigation related such as moving maps, labeled as non-required,” “Not approved for primary navigation” or “Situation Awareness Only (SA-Only).”
GAMA	Section 7, 23.1301 (page 173)	This section states “The Discussion of the Regulatory Amendments stated: The ARC did not make specific recommendations regarding § 23.1301.”		GAMA suggests the FAA define the abbreviation ARC means Aviation Rulemaking Committee.	Adopted.
GAMA	Section 7, 23.1301 (page 173)	This section states “The FAA expect applicants to coordinate or negotiate deviations from established means of compliance with the Administrator as early as possible to minimize delay to program schedules		.” GAMA believes the term “expect” should be the singular verb “expects”	Adopted.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA	Section 7, 23.1305 (page 199)	This section states “A copy of the advisory circular is available on the Internet at <a href="http://www.faa.gov/regulations_policies/">http://www.faa.gov/regulations_policies/</a> .”		Because this statement hasn’t been applied to all other referenced guidance but is more of a general note to all guidance and the URL may become outdated, GAMA suggests the FAA remove this statement in reference to AC 23-17C and include information on how to locate ACs in the reference section of this document.	Adopted.
GAMA	Section 7, 23.1305 (page 199)	This section states:  <i>... The proposed rule changes to §§ 23.1303, 23.1305, and 23.1311 would largely eliminate the need to issue ELOS findings for these systems and help standardize certification of new technology. The proposed rule changes to §§ 23.1305 and 23.1311 will largely eliminate the need to issue equivalent level of safety findings for these systems and help standardize certification of new technology.</i>		These sentences are nearly identical except for the omission of 23.1303 from the second sentence. GAMA recommends these sentences be combined.	Partially Adopted. Deleted the paragraphs.
GAMA	Section 7, 23.1307 (page 201)	This section states “The Discussion of the Regulatory Amendments stated: The ARC also did not make a specific recommendation for § 23.1307.”		GAMA recommends the removal of the word “also” from this sentence	Partially Adopted. Deleted the paragraph.
GAMA	Section 7, 23.1308 (page 202)	This section states “(6) <i>The adverse effects experienced by some aircraft when exposed to HIRF.</i> ” There are portions of the general aviation community that have never heard of actual cases where HIRF has had an adverse effect.		GAMA recommends the FAA include an example or two of how HIRF is known to cause adverse effect for the purposes of educating the community in general of HIRF like effects.	Not Adopted. The NPRM includes examples cited in the next paragraph.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA	Section 7, 23.1308 (page 202)	<p>This section states “(6) <i>The adverse effects experienced by some aircraft when exposed to HIRF.</i>” There are portions of the general aviation community that have never heard of actual cases where HIRF has had an adverse effect.</p>		GAMA recommends the FAA include an example or two of how HIRF is known to cause adverse effect for the purposes of educating the community in general of HIRF like effects.	Not Adopted. The NPRM includes examples cited in the next paragraph.
GAMA	Section 7, 23.1308 (page 203-204)	<p>This section states:</p> <p><i>It requires each electrical and electronic system that performs a function whose failure would significantly reduce the capability of the aircraft or the ability of the flightcrew to respond to an adverse operating condition to be designed and installed such that it is condition to be designed and installed such that it is not affected adversely when the equipment providing the function is exposed to equipment HIRF test level 1 or 2.</i></p> <p>The phrase “whose failure would significantly reduce” implies a major failure condition (as defined in AC 23.1309-1D/1E paragraph 8.v(3)). However, in this context, “adverse operating condition” is intended to be applied to functions with a hazardous failure condition (as defined in</p>		GAMA requests the FAA clarify the text so that required HIRF test levels are applied to the proper function condition.	Not Adopted. This is preamble.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1308 (page 203-204) (Continued)	AC 23.1309-1D 1E paragraph 8.v.(4)) and not to functions that have a major failure condition.			
GAMA	Section 7, 23.1308 (page 204)	<p>This section states:</p> <p><i>Additionally, the final rule requires each electrical and electronic system that performs a function whose failure would reduce (but not significantly) the capability of the aircraft or the ability of the flightcrew to respond to an adverse operating condition to be designed and installed such that it is not affected adversely when the equipment providing these functions is exposed to equipment HIRF test level 3.</i></p> <p>The phrase “whose failure would reduce (but not significantly)” implies a minor failure condition (as defined in AC 23.1309-1D/1E paragraph 8.v.(2)). However, in this context, “adverse operating condition” is intended to be applied to functions with a major failure condition (as defined in</p>		GAMA requests the FAA clarify the text so that required HIRF test levels are applied to the proper function condition	Not Adopted. This is preamble.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1308 (page 204) (Continued)	AC 23.1309-1D/1E paragraph 8.v.(3) and not to functions that have a minor failure condition. .  The phrase “whose failure would reduce (but not significantly)” implies a minor failure condition (as defined in AC 23.1309-1D/1E paragraph 8.v.(2)). However, in this context, “adverse operating condition” is intended to be applied to functions with a major failure condition (as defined in AC 23.1309-1D/1E paragraph 8.v.(3)) and not to functions that have a minor failure condition. .			
GAMA	Section 7, 23.1309 (page 214)	This section states “EASA requires applicants to use the EUROCAE documents that are technically identical to this ARP(s) listed.”		GAMA recommends the FAA change the word “this” to “the” in the phrase “this ARP(s) listed.”	Not Adopted. The paragraph has been deleted.
GAMA	Section 7, 23.1309 (page 222)	This section states “The Discussion of the Regulatory Amendments stated.”		The first sentence of this section should end with a colon to be consistent with other sections.	Not Adopted. The paragraph has been deleted.
GAMA	Section 7, 23.1309 (page 223)	This section states “This revision would address electronic engine controls and eliminate the need for special conditions to apply § 23.1309 to electronic engine control systems”.		This sentence should have a period added to the end of the sentence.	Not Adopted. The paragraph has been deleted.
GAMA	Section 7, 23.1309 (page 223)	This section states “The FAA clarify the certification		.” GAMA recommends the FAA replace the word “clarify” with “clarified”.	Not Adopted. The paragraph has been deleted.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1309 (page 223) (Continued)	requirements, environmental qualification test requirements, and our intent for determining proper ‘intended function’ of non- required systems and equipment that do not have a safety effect on the airplane			
GAMA	Section 7, 23.1309 (page 223)	<p>This section states “A problem with the current requirements for airplane manufacturers arises when certification authorities question installation of non-required systems and equipment that do not perform following their specifications and, therefore, are ‘not functioning properly when installed’.” GAMA believes this sentence could lead to confusion.</p> <p>Does this sentence mean the non-required equipment is “not turned on” or is “not performing its intended function because it hasn’t been asked to do so” or is “not performing its intended function due to a failure”?</p>		GAMA requests the FAA clarify this sentence.	Not Adopted. The paragraph has been deleted.
GAMA	Section 7, 23.1309 (page 224)	<p>This section states:</p> <p><i>System lightning protection specifically allows the loss of function and capability of some</i></p>		<p>GAMA suggests the following clarifying text of the quoted draft text:</p> <p><i>System cable bundle lightning testing, designed to evaluate functional upset during a lightning strike, specifically allows the functionality and capabilities of some electrical/electronic systems to be lost when</i></p>	Not Adopted. The paragraph has been deleted.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1309 (page 224) (Continued)	<i>electrical/electronic systems when the airplane is exposed to lightning, if “these functions can be recovered in a timely manner.”</i>		<i>the airplane is exposed to lightning, provided that “these functions can be recovered in a timely manner.” Given the short duration of the lightning strike, momentary upsets may be tolerated if the automatic recovery time is of a duration that does not lead to an adverse effect for systems with major, hazardous or catastrophic failure condition(s). It also allows permanent loss of functions at higher test levels associated with higher certification levels (as defined by AC 20-158 and AC 20-136A) than what is required. As an example, a system may have certain functions classified as having major failure conditions (AC 20-158 and AC 20-136A Certification Level C) while other functions are classified as having catastrophic failure conditions (AC 20-158 and AC 20-136A Certification Level A). In this case, when the system is tested to test levels associated with catastrophic failure conditions it is acceptable to for the test to result in a permanent loss of a function that has a major failure condition but it is not acceptable for the test to result in a catastrophic failure condition. However, no major or catastrophic failure conditions are acceptable when the system is tested to test levels associated with major failure conditions.</i>	
GAMA	Section 7, 23.1309 (page 224)	This section states “For example, it is not acceptable for an integrated avionics system to be approved until known functional defects in required functions are corrected.” An avionics system can be approved and still have known defects (e.g., software open problem reports) in required functions as long as the defects do not rise to the level that they are deemed not		GAMA recommends the FAA modify this sentence to be more accurate.	Not Adopted. The paragraph has been deleted.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1309 (page 224) (Continued)	certifiable. However, functional defects that are deemed not certifiable would have to be corrected prior to obtaining approval.			
GAMA	Section 7, 23.1309 (page 224)	This section states "... (e.g., the Requirements and Technical Concepts for Aviation (RTCA) ..." however RTCA no longer uses this title.		GAMA recommends this title be replaced by RTCA, Inc.	Not Adopted. The paragraph has been deleted.
GAMA	Section 7, 23.1309 (page 224)	This section states "This means of compliance identifies four classes of airplanes as defined in Appendix K of this proposal and applies appropriate probability values and development assurance levels for each class." NPRM 09-09 section §23.1309 and Appendix K proposes to codify of the long established means of compliance used for § 23.1309. As submitted with NPRM 09-09, GAMA is strongly opposed to codifying the means of compliance as development assurance is one means but not the only means of compliance for software and complex hardware to meet the rule. Furthermore, codifying the means of compliance significantly detracts from the ease of change allowed by leaving the means of compliance in AC 23.1309.		GAMA recommends the FAA coordinate this AC with any changes which are made to NPRM 09-09 and AC 23.1309-1e as a result of disposition of comments.	Not Adopted. The paragraph has been deleted.
GAMA	Section 7, 23.1309 (page 225)	This section states:  <i>The FAA added Appendix K to show</i>		GAMA recommends the FAA coordinate this AC with any changes which are made to NPRM 09-09 and AC 23.1309-1e as a result of disposition of comments.	Not Adopted. The paragraph has been deleted.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1309 (page 225) (Continued)	<p><i>the appropriate airplane systems probability standards, failure conditions, and related development assessments, refer to the probability values shown for hazardous failure conditions in Appendix K. assurance for four certification classes of airplanes designed to part 23 standards. The Appendix K development assurance levels correlate to the software levels in RTCA/DO-178B and the complex design assurance levels in RTCA/DO-254. The FAA provided quantitative values in Appendix K to indicate the order of probability range for each certification class and failure condition.</i></p> <p><i>As used in § 23.1309, the FAA's intended definitions for terms used in Appendix K: Allowable Qualitative Failure Condition Probabilities a. Extremely remote failure conditions: Those failure conditions not anticipated to occur to each airplane during its total life but may occur a few</i></p>			

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1309 (page 225) (Continued)	<p><i>times when considering the total operational life of all airplanes of this type. For quantitative</i></p> <p><i>b. Extremely improbable failure conditions: For commuter category airplanes, those failure conditions so unlikely that they are not anticipated to occur during the entire operational life of all airplanes of one type. For other classes of airplanes, the likelihood of occurrence may be greater. For quantitative assessments, refer to the probability values shown for catastrophic failure conditions in Appendix K.</i></p> <p><i>c. Probable failure conditions: Those failure conditions anticipated to occur one or more times during the entire operational life of each airplane. These failure conditions may be determined on the basis of past service experience with similar components in comparable airplane applications. For quantitative assessments, refer to the probability values</i></p>			

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1309 (page 225) (Continued)	<p><i>shown for minor failure conditions in Appendix K.</i></p> <p><i>d. Remote failure conditions: Those failure conditions that are unlikely to occur to each airplane during its total life but may occur several times when considering the total operational life of a number of airplanes of this type. For quantitative assessments, refer to the probability values shown for major failure conditions in Appendix K.</i></p> <p>NPRM 09-09 section §23.1309 and Appendix K proposes to codify of the long established means of compliance used for § 23.1309. As submitted with NPRM 09-09, GAMA is strongly opposed to codifying the means of compliance as development assurance is one means but not the only means of compliance for software and complex hardware to meet the rule. Furthermore, codifying the means of compliance significantly detracts from the ease of change allowed by leaving the means of compliance in AC 23.1309.</p>			
GAMA	Section 7, 23.1309 (page 225)	This section states “e. Design appraisal: A qualitative appraisal of the		GAMA recommends this text not be included in the guidance material and additionally that appendix K as proposed in	Not Adopted. The paragraph has been deleted.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1309 (page 225) (Continued)	integrity and safety of the system design. An effective appraisal requires experienced judgment.” GAMA is strongly opposed to codifying the means of compliance as development assurance is one means but not the only means of compliance for software and complex hardware to meet the rule. Additionally, § 23 Appendix K makes no reference to the term “design appraisal”.		NPRM 09-09 be included as guidance to §23.1309 in place of codification in regulation.	
GAMA	Section 7, 23.1309 (page 225)	<p>This section states:</p> <p><i>f. Development assurance level: All planned and systematic actions used to substantiate, to an adequate level of confidence, that errors in requirements, design, and implementation have been identified and corrected such that the system satisfies the applicable certification basis. (The development assurance levels in Appendix K are intended to correlate to software levels in RTCA/DO-178B and complex hardware design assurance levels in RTCA/DO-254 for the system or item.)</i></p> <p>NPRM § 23.1309 and</p>			Not Adopted. The paragraph has been deleted.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1309 (page 225) (Continued)	Appendix K proposes to codify of the long established means of compliance used for § 23.1309. As submitted with the § 23 NPRM, GAMA is strongly opposed to codifying the means of compliance as development assurance is one means but not the only means of compliance for software and complex hardware to meet the rule. Furthermore, codifying the means of compliance significantly detracts from the ease of change allowed by leaving the means of compliance in AC 23.1309. GAMA recommends the FAA coordinate this AC with any changes which are made to NPRM 09-09 and AC 23.1309-1e as a result of disposition of comments.			
GAMA	Section 7, 23.1309 (page 226)	This section states "... Simple systems do not contain software or complex hardware requiring compliance by documents. ..." GAMA disagrees that a simple and conventional system cannot have software or complex electronic devices. The implication of making this statement is that essentially all avionics assessed as having a Major failure classification will require quantitative analysis for § 23.1309 compliance even if the non-SW/CEH aspects of the system are			Not Adopted. The paragraph has been deleted.

<b>Company or Group</b>	<b>Page and Paragraph</b>	<b>Comment</b>	<b>Rationale</b>	<b>Recommendation</b>	<b>Disposition</b>
GAMA (Continued)	Section 7, 23.1309 (page 226) (Continued)	simple and possibly even redundant. The SW and CEH aspects are covered by the development assurance requirements of DO-178B and DO-254, respectively. There is no reason to require quantitative analysis of an otherwise simple and possibly redundant system just because it has SW/CEH when the SW/CEH aspects aren't considered in the quantitative analysis anyway. If the system is non-traditional or complex in itself then quantitative analysis should be required but the inclusion of SW or a CEH device shouldn't be the limiting factor. GAMA recommends this sentence be deleted.			
GAMA	Section 7, 23.1309 (page 226)	This section states "Any procedures for the flight crew to follow after the occurrence of a failure indication or annunciation would be described in the approved Airplane Flight Manual (AFM), AFM revision, or AFM supplement, unless they are accepted as part of normal aviation abilities." The phrase "normal aviation abilities" does not seem to convey the intent of this sentence. GAMA suggests changing the phrase "normal aviation abilities" to "normal aviation operational conventions" or "conventional aviation			Not Adopted. The paragraph has been deleted.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1309 (page 226) (Continued)	procedures”.			
GAMA	Section 7, 23.1309 (page 226)	This section states “ <i>Previous</i> § 23.1309 (c) and (d) are not directly related to the other safety and analysis requirements of § 23.1309.” GAMA suggests the FAA remove italics from “Previous” in this sentence.			Not Adopted. The paragraph has been deleted.
GAMA	Section 7, 23.1311 (page 233)	This section references “... In § 23.1311(a)(5), ...” GAMA recommends the FAA insert a space between the word “In” and the character “§”.			Not Adopted. The paragraph has been deleted.
GAMA	Section 7, 23.1311 (page 234)	This section states “In § 23.1311(b), we replace the phrase “remain available to the crew, without need for immediate action” with “be available within one second to the crew with a single pilot action or by automatic means.” As submitted with GAMA’s comments to NPRM 09-09, we suggest changing the word “with” in the phrase “be available within one second to the crew with a single pilot action or by automatic means” should be changed “by” so that the phrase reads “be available within one second to the crew by a single pilot action or by automatic means.”			Not Adopted. The paragraph has been deleted.
GAMA	Section 7, 23.1311 (page 234)	This section states “There are three acceptable methods for meeting the requirements of § 23.1311(b)—(1)			Not Adopted. The paragraph has been deleted.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1311 (page 234) (Continued)	dedicated standby instruments, (2) dual primary flight displays (PFDs), or (3) reversionary displays that display independent attitude.” To be consistent with the NPRM § 23.1311(b), the word “attitude” in this sentence GAMA recommends replacing this with the phrase “information essential for continued safe flight and landing”.			
GAMA	Section 7, 23.1311 (page 234)	This section states” Malfunctions that result in automatic switching would be extensive enough to ensure PFI is available at the reliability level required by § 23.1309.” GAMA believes this sentence could lead to confusion. What is meant by the phrase “would be extensive enough to ensure PFI is available”? Please clarify this sentence in the guidance material.			Not Adopted. The paragraph has been deleted.
GAMA	Section 7, 23.1311 (page 234)	This section states “... All modes, sources, frequencies, and flight plan data should be exactly as they were on the PFD before the failure” GAMA does not believe “All modes, sources, frequencies, and flight plan data” is really considered “information essential for continued safe flight and landing” per NPRM § 23.1311(b). GAMA recommends the FAA adjust this sentence			Not Adopted. The paragraph has been deleted.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1311 (page 234) (Continued)	to properly scope this information and also add a period to the end of the sentence.			
GAMA	Section 7, 23.1311 (page 234 - 235)	This section states “Manual activation of the reversionary mode on the MFD through single action by the pilot would be acceptable when procedures to activate the PFI are accomplished before entering critical phases of flight.” GAMA recommends the FAA change the phrase “activate the PFI” to “activate the PFI on the MFD”.			Not Adopted. The paragraph has been deleted.
GAMA	Section 7, 23.1326 (page 251)	This section states “4. The eligibility of other IFR approved airplanes, including those with the service ceilings below 18,000 feet, is determined jointly by the ACOs and the Small Airplane Standards Office.” GAMA recommends the FAA replace “Small Airplane Standards Office” with “Small Airplane Directorate”.			Adopted.
GAMA	Section 7, 23.1331 (page 273)	This section states “3. Different types of power, electrical and vacuum, are installed for primary and secondary instruments.” GAMA recommends the FAA remove the extra space between “vacuum,” and “are”.			Adopted. Changed to: “Different types of power, electrical and vacuum, are installed for primary and secondary instruments.”
GAMA	Section 7, 23.1353 (page 284 – 285)	This section states:  <i>The battery for the 30-minute criteria, therefore, should be an independent power</i>			Partially Adopted. Bold face remains.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1353 (page 284 – 285) (Continued)	<p><i>source from the airplanes starter battery. If adequate monitoring and procedures are incorporated so the pilot knows the airplanes starter battery meets the 30-minute criteria after an engine start and during all other operations, an ELOS finding may, with FAA approval, be an acceptable method for using the airplanes starter battery.</i></p> <p>GAMA recommends the FAA change “airplanes” to “airplane’s” (possessive) in two instances and also remove boldface from the phrase “may, with FAA approval, be”.</p>			
GAMA	Section 7, 23.1353 (page 286)	<p>This section states “The FAA did not envision integrated, electric cockpits when we developed § 23.1353(h).” GAMA recommends the FAA adjust § symbol so that the section symbol and 23.1353(h) are on the same line as in other references (can cut-and-paste another use of the special Word § symbol from the preceding paragraph).</p>			Adopted.
GAMA	Section 7, 23.1357 (page 289)	<p>This section states “2. For airplane systems with a certification basis at Amendment 23-41 or later: When the failure condition of the loss of the</p>			Adopted.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1357 (page 289) (Continued)	function is determined to be ‘major,’ ‘hazardous,’ or ‘catastrophic’ [according to § 23.1309 and AC 1309-1D safety assessment, which also considers operational and airworthiness requirements], it has a significant impact on safety in flight and is considered ‘essential to safety in flight.’” GAMA recommends the FAA C=change “AC 1309-1D” to “AC 23.1309-1E”.			
GAMA	Section 7, 23.1357 (page 289)	This section states “**According to § 23.1309 and AC 1309-1D safety assessment, which also considers operational and airworthiness requirements.” GAMA recommends the FAA C=change “AC 1309-1D” to “AC 23.1309-1E”			Adopted.
GAMA	Section 7, 23.1357 (page 291)	This section states “In this situation, all the correct environmental test conditions, such as indirect effects of lightning and High Intensity Radiated Fields (HIRF) standards, should be addressed for the installation.” It is unclear why a fuse located internally requires mention of “correct environmental test conditions, etc.” verses a			Partially Adopted. Deleted “internal” from the preceding sentence so it applies to all C/Bs and fuses that are out of reach.
GAMA (Continued)	Section 7, 23.1357 (page 291) (Continued)	fuse located externally as this would seem appropriate for both locations. GAMA recommends the FAA remove this sentence.			

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1443 (page 339) (Continued)	This section states “The Discussion of the Regulatory Amendments stated: Currently we address oxygen” GAMA recommends the FAA insert a space between “stated:” and “Currently”.			
GAMA	Section 7, 23.1443 (page 340)	This section states “The Discussion of the Regulatory Amendments stated: stated:Currently we address oxygen” GAMA recommends the FAA delete a redundant instance of the word “stated”			Adopted.
GAMA	Section 7, 23.1457 (page 350)	This section states “... and if data-link communication equipment is installed, require that all data- link communications received on an aircraft be recorded. ...” GAMA recommends the FAA delete the space between “data-” and “link” in the second instance of “data-link”.			Partially Adopted. Changed all to datalink for consistency.
GAMA	Section 7, 23.1457 (page 351)	This section states “... <i>Current regulations require that 15 minutes to 30 minutes of cockpit voice communication be recorded and do not specify the recording medium. The new operating requirements are proposed in Sec. Sec. 91.609(i)(2), 121.359(i)(2), 125.227(g)(2), and 135.151(f)(2).</i> ” GAMA recommends the FAA delete repeated instance of “Sec.” from the phrase “proposed in Sec. Sec. 91.609(i)(2)”.			Adopted. Deleted in multiple places.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1457 (page 352) (Continued)	<p>This section states:</p> <p><i>Proposed Sec. Sec. 91.609(j), 121.359(j), 125.227(h), and 135.151(g) would include the requirement for all newly manufactured airplanes or rotorcraft that are required to have a cockpit voice recorder and a flight data recorder, and that have data-link communication equipment installed, to record the data-link communication in accordance with the proposed changes to the certification rules. These proposed changes are found in Sec. Sec. 23.1457(a)(6), 25.1457(a)(6), 27.1457(a)(6), and 29.1457(a)(6).</i></p> <p><i>In addition, proposed Sec. Sec. 91.609(k), 121.359(k), 125.227(i), and 135.151(h) would include the proposed requirement that if data-link communication equipment is installed on any aircraft 2 years after the effective date of the final rule those aircraft must record all data-link communications in</i></p>			Partially Adopted. Deleted in multiple places and changed to “datalink” everywhere for consistency.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
GAMA (Continued)	Section 7, 23.1457 (page 352) (Continued)	<i>accordance with the proposed certification rule as of the time of equipment installation.</i>  GAMA recommends the FAA Delete repeated instance of "Sec." from the phrases: "Sec. Sec. 91.609(j)," "Sec. Sec. 23.1457(a)(6)," & "Sec. Sec. 91.609(k)". Additionally delete the space between "data-" and "link" in the last instance of "data-link".			
GAMA	Section 7, 23.1457 (page 357)	This section states "Is installed in accordance with the requirements of Sec. 23.1457." GAMA recommends the FAA remove boldface from the letter "I" in the word "Is".			Adopted.
Embraer	23.855	The proposed guidance for 23.855 says that compliance with the option of subparagraph (c)(3) to contain compartment fires requires that the compartment be fireproof, which means that the compartment lining must be shown to be equivalent to steel in flame penetration resistance.	This is appropriate for torching flame fires that can originate inside designated fire zones but is not necessary for the risk of baggage compartment fires.	The preamble of the NPRM that proposed this requirement cites service experience principally in transport category airplanes as a justification so Embraer believes that a requirement similar to the flame penetration standard of Part III of Appendix F of 14 CFR, part 25 is more appropriate.	Not Adopted. The rule does not limit what can be carried in the cargo compartment so we do not assume any specific type of fire will or will not occur.
Embraer	23.863	The proposed guidance for compliance with Amendment 23-23 requires qualification with the explosion proof requirement with DO-160F.	Embraer believes it would be better to not preclude other compliance methods, whether by testing to a different version of DO-160, similarity to currently qualified equipment, or by some other method (military qualification for example).	We suggest the last sentence of the second paragraph be written as: "One method to demonstrate minimization of ignition is to qualify equipment installed where a single failure can cause flammable fluid leakage to the explosion proof standards in RTCA/Do-160."	Not Adopted. Minimization requires that electrical devices in flammable fluids and vapors are explosion proof.
Cessna	23.677(d), Amdt 23-24 (and other sections as well)	This section mentions "unlikely" as a term for probability for	The use in AC 23-17 by contrast is more ambiguous and incomplete.	Clarify.	Adopted. Changed to § 23.1309 probability terms.

Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
Cessna (Continued)	23.677(d), Amdt 23-24 (and other sections as well) (Continued)	AC23.1309-1; the term as used in AC 23.1309-1 always includes other terms to define how unlikely, e.g. "those failure conditions so unlikely that they are not anticipated to occur during the entire operational life of all airplanes of one type".			
Cessna	P.183 Standby attitude indicator power	This complicates a simple pilot procedure issue.		Cessna Engineering suggests as in some part 25 aircraft, there is simply an amber light near the standby power switch that illuminates when the standby is using its dedicated battery as the source. This both alerts the crew on shut down that something is still powered as well as providing in-flight indication when the limited time battery is in use.	Not Adopted. Transports have highly trained pilots with extensive checklists. Small airplanes have a wide range of pilot training and no required crew training.
Cessna	P.224 23.1309(a)(3):.	Cessna Engineering has issue with this one	The probability requirements as applied in 23.1309 are based on random distribution across a fleet of aircraft, i.e. the 10E-5 event can happen the first hour (then not for another 100,000 hours) and be fully compliant with the requirements. They simply cannot be applied to the typical flight test or F&R environment because the sample is too small to determine if the probability has really been met.	Cessna Engineering proposes that the FAA consider language to reflect what is current practice in some areas of aircraft development and certification; that is to require root cause analysis and corrective action (including traceability to production incorporation of the change) for any and all failures encountered during the identified phase of flight test, F&R, qualification or bench testing with more robust corrections along with substantiation of the correction required for higher criticality parts.	Partially Adopted. That paragraph has been deleted.
Cessna	P.224/225 Discussion of 14 CFR 23 Appendix K:	This is excellent advisory material, yet historically many aircraft certification projects have failed to meet the exact probability requirements and/or DAL requirements now being codified by addition of this appendix to the rule.		Cessna Engineering recommends it be placed back in guidance material.	Adopted. It will remain in AC 23.1309.
Cessna	P. 286 23.1353 Amend 23-60 Battery Endurance	Cessna Engineering disagrees with what appears to be an arbitrary delineation of battery endurance between less	Scale the requirement to the performance capability and equipage of the aircraft (e.g. speed brakes that can allow a more rapid descent for a jet than a lower performance aircraft not so equipped).	Perhaps a performance based rule would read: the greater of 30 minutes or the demonstrated safe descent from max certificated altitude to a simulated landing plus 10 minutes.	Not Adopted. The AC only reflects the rule change.

<b>Company or Group</b>	<b>Page and Paragraph</b>	<b>Comment</b>	<b>Rationale</b>	<b>Recommendation</b>	<b>Disposition</b>
Cessna (Continued)	P. 286 23.1353 Amend 23-60 Battery Endurance (Continued)	than and greater than 25,000 feet.			
Cessna	23.1301, page 167	Lightning is referenced as part of the requirements addressed by AC 23.1309-1E in the following paragraph.	Cessna Engineering does not believe this is not entirely true; Direct Effects is not addressed, only IEL (this is not clear and subject to interpretation).	This needs to be clarified in the following excerpt, with IEL listed as an Acronym.	Not Adopted. Indirect effects of lightning is written out in all cases and installed equipment is subject to IEL, but the direct effects of lightning is on structure and is required by § 23.867 whether § 23.1309 is required or not.
Cessna	23.1301, page 167	In this policy, the environmental qualifications will be determined by the failure conditions of the equipment, as defined in AC 23.1309-1E. Currently, software and hardware developmental assurance levels, probability of failures, and lightning and High Intensity Radiated Fields (HIRF) protection levels are determined by the failure condition classification. This policy is incorporating the same concept.	IEL is only being addressed in this AC draft in 23.1309(e), even though 23.1309(e) as the rule addresses “Lightning (direct and indirect effects of)”.	Note only. No change suggested.	Not Adopted. Installed equipment is subject to IEL, but the direct effects of lightning is required by § 23.867 whether § 23.1309 is required or not.
Cessna	23.1301 and 23.1309: page 168	Cessna Engineering believes this is unclear.	Is this tying together 23.1301, 23.1309(e), HIRF (via 23.1308) and IEL (via 23.1309)? In other words would an approval for 23.1301 include HIRF and IEL aspects as well?	Table 1 on page 170 is incorrect for HIRF and IEL aspects. Need to reference AC 20- 158 if this table is to be included in section for 23.1301	Not Adopted. Section 23.1301 does not require HIRF or lightning testing. It requires the intended function be identified. Sections 23.1309 and 23.1431

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Cessna (Continued)	23.1301 and 23.1309: page 168 (Continued)				require compliance for environmental effects on the intended function of the systems and equipment.
Cessna	23.1309(e)	Since 23.1309(e) with regards to Lightning Protection is discussed only for IEL aspects in this AC, there should be discussion about the other aspects of overall Lightning protection aspects as prescribed by 23.867 and 23.1309(e).		Rule currently states “Lightning (Direct and Indirect Effects of)”, but AC only addresses IEL with regards to Lightning Protection (see page 214). Cessna Engineering suggests that Lightning Direct Effects and Electrical Bonding aspects of Electrical/Electronic equipment should be addressed in 23.867, and that 23.1309(e) should really only address IEL aspects.	Not Adopted. Section 23.867 does address direct effects of lightning, but § 23.1309(e) address both IEL and direct effects.
Cessna	23.1309(e)	“EEC Systems” on page 215 does not adequately state what all is required for Part 23; only provides flight test stipulation as an additional requirement for Part 23.		There needs more to be here, or take the paragraph completely out since the paragraph after this one addresses the end-of-the-day requirements. A possible outcome with this verbiage in the AC is for flight testing to be the only requirement outside of Part 33 that needs to be considered for Part 23 TC. The excerpt being referred to is provided below:  “Acceptance of either engine mounted and engine certificated Full Authority Digital Electronic Engine Control (FADEC) or EECs does not mean that approval at the airplane level is automatic. Flight-testing is still required to assure all part 23 requirements are met.	Adopted. Agree that the paragraph is not clear. Deleted the sentence: “Flight-testing is still required to assure all part 23 requirements are met.”
Cessna	23.1309(e)	Safety Assessment Process” on page 217 does not address HIRF/IEL in that although quantitative analysis may be used to provide the overall functional hazard condition to be considered for HIRF/IEL (typically it is qualitative not quantitative analysis that does this), HIRF/IEL System aspects associated with the functional hazard condition can only be		It must be assumed for certification that the HIRF and Lightning Environments will always exist, that the aircraft will be flying in these environments, therefore the probability of a HIRF and Lightning encounter must be considered to be 1...therefore Quantitative analysis does not apply to HIRF/IEL safety analysis outside setting the Level A/B/C system requirement, which is the top-level functional hazard condition. Also, there should be discussion of “system recovery in a timely manner” with regards to safety aspects of 23.1309(e); This verbiage is provided in SAE ARP5583A, and Cessna	Not Adopted. Suggest review of AC 23.1309-1E is the correct place for this comment.

<b>Company or Group</b>	<b>Page and Paragraph</b>	<b>Comment</b>	<b>Rationale</b>	<b>Recommendation</b>	<b>Disposition</b>
Cessna (Continued)	23.1309(e) (Continued)	addressed by Qualitative analysis, not Quantitative analysis. The following comments here may need to be addressed in the AC 23.1309-E1 document,		Engineering recommends having this in the AC as well.	
Cessna	23.1431(a)	HIRF and Lightning are critical environmental conditions, but are covered by 23.867, 23.1308, and 23.1309(e). EASA leans to having HIRF and Lightning be included for consideration for 23.1431(a), but FAA considers HIRF and Lightning to be taken care of by the specific regulations that consider these environments, therefore do not need to address HIRF and Lightning in 23.1431(a).	It needs to be addressed in this AC as well for 23.1431(a). Note: 23.1309(e) in this AC points to 23.1308 for HIRF aspects of 23.1309(e);	Cessna Engineering suggests the same be done for 23.1431(a) with regards to critical environmental conditions – i.e. point to 23.1308 for HIRF, 23.867 for Lightning Direct Effects, and 23.1309(e) for IEL	Partially Adopted. Added the following to § 23.1431, Amdt. 23-43 and Subsequent: “See § 23.867 for lightning direct effects, § 23.1309(e) for lightning direct and indirect effects, and § 23.1308 for HIRF.”