

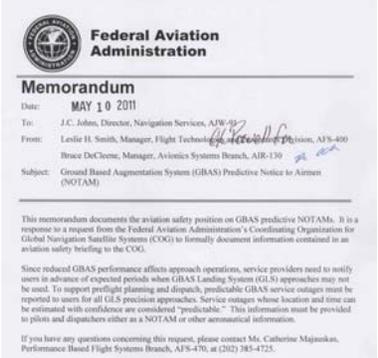
**Clearance Record  
DOCUMENT COMMENT LOG**

<b>Originating Office:</b> AIR-130	<b>Document Description:</b> AC 20-138C Consolidated Field Comments	<b>Project Lead:</b> Kevin Bridges	<b>Reviewing Office:</b>	<b>Date of Review:</b>
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<b>Organization</b>	<b>Page &amp; Paragraph</b>	<b>Comment</b>	<b>Rationale for Comment</b>	<b>Recommendation</b>	<b>Disposition</b>
ACE-100	Page 10 Paragraph 3-4(a)(2)(a)	The AC states that the TSO-C115b “must have level B software.” I think this is in conflict with the TSO which calls out level C software.	TSO-115b calls out level C software.	Make the statement consistent with the TSO.	<b>Not Accepted.</b> The discussion concerns an FMS applicant requesting a C146c Class Gamma-3 TSOA to provide LP/LPV capability. This is a “hazardous” failure condition that requires Level B software. The discussion also includes partitioned software for the LP/LPV implementation. The other method to achieve LP/LPV capability with a level C FMS is to implement a Class Delta architecture as described in 3-4.a(2)(b).
AFS-400	Page 1 Paragraph f.	“AC 90-101A, <i>Approval Guidance for RNP Procedures with SAAAR</i> ,” title updated: AC 90-101A, Approval Guidance for RNP Procedures with AR	Title was updated in the regulatory guidance library to match the document <a href="http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/f3401c201e1226d6862578450056e">http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/f3401c201e1226d6862578450056e</a>	AC 90-101A, Approval Guidance for RNP Procedures with AR	<b>Accepted.</b> Performed a global search to make the change.

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			33e/\$FILE/AC%2090-101A_RGL.pdf		
AFS-400	Page 3 B (2)	For clarification, “GPS/SBAS” means SBAS using GPS (vice GLONASS, ect), right?	GPS/SBAS could be read by some people as GPS or SBAS. (I have gotten this question in the past)	If so could you note that “GPS/SBAS” and “GPS/GBAS” mean <i>SBAS augmenting GPS</i> and <i>GBAS augmenting GPS</i> in a footnote?	<p><b>Partially Accepted.</b> Included the following note after paragraph 1-1.a where the acronyms GPS, SBAS, and GBAS are first defined:</p> <p><b>Note:</b> For standardization within this document, the acronyms GPS/SBAS and GPS/GBAS are used to indicate SBAS augmenting GPS and GBAS augmenting GPS respectively.</p>
AFS-400	Page 16 4-3	Limitatations. Title misspelled		Limitations	<b>Accepted.</b>

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AFS-400	Page 19 5-2 (b)	Recommend revising this sentence: “Special Federal Aviation Regulation (SFAR) 97 does not permit using TSO-C129(AR) and TSO-C196(AR) equipment on ‘T’ or ‘Q’ routes.” And adjusting this sentence, “However, there is an ongoing program to either revise or delete the SFAR 97 requirements.”	<p>After determine that radar monitoring is possible on all the Q routes in Alaska, now C129 (AR) and C196 (AR) equipment can be used to fly the Alaska Q routes. The new guidance is available per the IFR Enroute High Altitude Chart – Alaska (and also outlined in OpSpec B035). Chart note since Oct 2011:</p>  <p>Alaska Q routes require GNSS and radar surveillance. Within the CONUS, GNSS or DME/DME/IRU RNAV required, unless otherwise indicated. DME/DME/IRU aircraft require radar surveillance. Refer to Airport/Facility Directory for DME information.</p> <p>T-routes still require TSO-C145/146 (AR)</p> 	Suggest: Special Federal Aviation Regulation (SFAR) 97 provides guidance on flying in Alaska. Alaska Q routes require GNSS (C129 (AR), C196 (AR), C145 (AR) or C146 (AR)) and radar surveillance. Alaska T routes require TSO C145 (AR) or C146 (AR). There is an ongoing program to either revise or delete the SFAR 97 requirements.	<b>Accepted.</b>
AFS-400	Page 21 5-2.3 a	“Flight Standards defines the operational requirements to review NOTAMs, review published aeronautical information, <del>or</del> perform pre-departure receiver autonomous integrity monitoring (RAIM) or FDE availability checks.”	“or” is not correct in this sentence since Flight Standards does define the requirements to do all of those tasks. I think RAIM or FDE availability checks is correct use of “or”.	Suggest “Flight Standards defines the operational requirements to review NOTAMs, review published aeronautical information, <del>or</del> perform pre-departure receiver autonomous integrity monitoring (RAIM) or FDE availability checks.”	<b>Partially Accepted.</b> Replaced ‘or’ with ‘and’ since all of the tasks are required.

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		“or” should be eliminated			
AFS-400	Page 21 5-2.3 a	<p>Please add a requirement sentence about GBAS predictive NOTAMS.</p> <p>AC 20-138A, page 19 said “The FAA plans to provide NOTAM service for all approach operations using TSO-C145a or TSO-C146a equipment, and for GLS operations using LAAS equipment.”</p>	<p>May 10, 2010 memo from AIR-130 &amp; AFS-400 to Navigation Services.</p> 	<p>Suggest adding a few sentences to support GBAS predictive information along the lines of the statements in the memo,</p> <p>“Since reduced GBAS performance affects approach operations, service providers need to notify users in advance of expected periods when GBAS Landing System (GLS) approaches may not be used. To support preflight planning and dispatch, predictable GBAS service outages must be reported to users for all GLS precision approaches. Service outages whose location and time can be estimated with confidence are considered “predictable.” This information must be</p>	<p><b>Partially Accepted.</b> The memo does not indicate that the NOTAM service exists for GBAS, it simply says one is needed. The existing 20-138C sentence was changed and combined with the next sentence as follows to be less wordy:</p> <p>“The FAA provides these services through NOTAMS for GPS/SBAS equipment for domestic navigation operations. Either the FAA or the service provider provides this NOTAM service for GPS/GBAS equipment for domestic navigation operations depending upon the specific ground facility status; Federal or non-Federal.”</p>

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				provided to pilots and dispatchers either as a NOTAM or other aeronautical information.”	
AFS-400	Appendix 7-1 letter L. GLONASS	<b>Update phrase</b> “GLONASS is <del>not</del> fully operational”	<p><b>GLONASS Fully Operational, First Time in 15 Years</b>  BY: RICHARD B. LANGLEY  <i>GPS World</i>  08 December 2011</p> <p>For the first time in more than 15 years, GLONASS is fully operational, with 24 satellites in their designated orbital slots, set healthy, and providing world coverage.</p> <p>GLONASS 744, an M-class satellite and one of three launched from Baikonur on 4 November, was set healthy December 8 at 07:42 UTC, bringing the number of healthy operating satellites to the full complement of 24.</p>	<b>Update phrase</b> “GLONASS is <del>not</del> fully operational”	<p><b>Partially Accepted.</b> GLONASS is “fully operational”; however, the caveat is that not all the satellites in the GLONASS constellation provide code division multiple access signals that could be compatible with GPS. Many of the GLONASS satellites only provide frequency division multiple access signals. Additionally, the FAA still has not approved GLONASS for operational use in the U.S. because Russia has not released performance and interface documentation similar to the GPS performance standard. The definition has been changed as follows (changes shown in italics):</p>

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					<p>GLONASS is a Russian Federation satellite-based radio navigation system providing a global positioning service. GLONASS has 24 operational satellites in their designated orbital slots. But, GLONASS is not yet approved for IFR operations in the United States National Airspace System.</p>
AFS-400	Appendix 8 letter jj	<p>“AC 90-101A, <i>Approval Guidance for RNP Procedures with SAAAR</i>,” title updated: AC 90-101A, Approval Guidance for RNP Procedures with AR</p>	<p>Title was updated in the regulatory guidance library to match the document: <a href="http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/f3401c201e1226d6862578450056e33e/\$FILE/AC%2090-101A_RGL.pdf">http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/f3401c201e1226d6862578450056e33e/\$FILE/AC%2090-101A_RGL.pdf</a></p>	AC 90-101A, Approval Guidance for RNP Procedures with AR	<p><b>Accepted.</b> Performed a global search to make the change.</p>
AFS-400	Page 1 Paragraph f.	<p>“AC 90-101A, <i>Approval Guidance for RNP Procedures with SAAAR</i>,” title updated: AC 90-101A, Approval Guidance for RNP Procedures with AR</p>	<p>Title was updated in the regulatory guidance library to match the document <a href="http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/f3401c201e1226d6862578450056e33e/\$FILE/AC%2090-">http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/f3401c201e1226d6862578450056e33e/\$FILE/AC%2090-</a></p>	AC 90-101A, Approval Guidance for RNP Procedures with AR	<p><b>Accepted.</b> Performed a global search to make the change.</p>

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			101A_RGL.pdf		
ANM-100	Various ANM-100D	Thanks for using the Change Tracking feature.	Change bars make it easy to identify what changed.		<b>Noted for AIR-500.</b>
ANM-100	Page 3; Para 1-4.b.(2)  ANM-110 Meyers	Should also refer to Chapter 10, equipment performance – Baro VNAV.	Editorial: Chapter 10 also has additional information regarding baro VNAV.	See comment.	<b>Accepted.</b>
ANM-100	Page 10; Para 3-4.(2)  ANM-110 Meyers	Delete "requiring level B software"	Software level is discussed in next paragraph and doesn't need to be mentioned here. See next comment regarding requiring level B software.	See comment.	<b>Accepted.</b>
ANM-100	Page 10; Para 3-4.(2)(a)  ANM-110 Meyers	Change "must" to "typically"	The word "must" in the first sentence is too strong and does not allow implementations using an alternate means such as guidance in AC 20-174 for independent functions. Even	See comment.	<b>Accepted.</b>

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			the MOPS say that another acceptable approach is to substantiate sw levels in the SSA. The real requirement is the classification of hazardous.		
ANM-100	Page 11; Para 3-4.b.(2)  ANM-110 Meyers	Delete "other than LP/LPV"	Editorial: The "other than LP/LPV" is not needed.	See comment.	<b>Not Accepted.</b> There is a subtle difference in that that this is the first discussion of TSO-C115c; the previous paragraphs discuss revision 'b'. The paragraph reinforces that neither TSO-C115c nor DO-283A is acceptable for LP/LPV. Additionally, this paragraph is the lead-in for the next paragraph.
ANM-100	Page 18,  Paragraph 5-1.a  ANM-100L	Need to clarify if the last sentence is referring to ADS-B Out or ADS-B in?  If it is applicable to ADS-B Out, should consider tie-in this information to the upcoming revision of AC 20-165A (Installation of ADS-B Out), if applicable.	AC 20-165 does not specify this information currently.	Clarify.	<b>Not Accepted.</b> The statement is clear that GNSS equipment intending to support <u>any</u> application after 2020 (ADS-B is only one example) should be using the Table 1 Effective Noise Density values. This is true for simple navigation applications as well.

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ANM-100	Page 63; Para 10-1.b.(3) and (4)  ANM-110 Meyers	Change paragraph numbers from 10-1.b.(3) and (4) to 10-1.c. and d.	Sub-bullets (3) and (4) are not only associated with temperature compensation.		<b>Accepted.</b>
ANM-100	P. 69 ¶ 11-3  ANM-100D	Replace ( <i>latest revision</i> ) with the actual revision.	AC 20-115B is specific to DO-178B. Pending revision is not likely to have DO-178B in the title.	AC 20-115B, <i>Radio Technical Commission for Aeronautics, Inc.</i> (or latest revision), defines ...	<b>Accepted.</b> Paragraph 11-3 modified to address DO-178C.
ANM-100	Page 69; Para 11-3  ANM-110 Meyers	Add the following note to end of paragraph:  " <b>Note:</b> It may be possible to obtain approval for navigation functions that have hazardous level effects (e.g., LPV, RNP AR < 0.3) with FMS software developed to DO-178B level C criteria. AC 20-174 provides an acceptable method for establishing development assurance levels. This guidance may be helpful for navigation architectures containing	Allows an approval path for FMS's that have been developed to level C criteria.	See comment.	<b>Partially Accepted.</b> Deleted the parenthesis information since it is not needed and changed 'development assurance' to 'design assurance' for consistency within AC 20-138C.

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		independent functions.			
ANM-100	Page 88 & 94 Para. 14-6.8b. & 14-8.13b.  ANM-110 Meyers	With respect to last sentence in paragraph, change "vertical performance scales" to "FMS performance monitoring and alerting."	Alternatively, define vertical performance scales.	See comment.	<b>Accepted.</b>
ANM-100	Page A2-15 Para A2-5.b.  ANM-110 Meyers	Delete the note.	The note is confusing and gives the impression that the preceding requirement is not a requirement.	See comment.	<b>Accepted.</b>
ANM-100	Page A2-15 Para A2-5.b.  ANM-110 Meyers	Add the following note to end of paragraph:  " <b>Note:</b> It may be possible to obtain approval for navigation functions that have hazardous level effects (e.g., RNP AR < 0.3) with FMS software developed to DO-178B level C criteria.	Allows an approval path for FMS's that have been developed to level C criteria.	See comment.	<b>Partially Accepted.</b> Inserted the following note addressing the thought based on AC 20-174 not being only for software:  <b>Note:</b> AC 20-174, <i>Development of Civil Aircraft and Systems</i> , provides an acceptable

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		AC 20-174 provides an acceptable method for establishing development assurance levels. This guidance may be helpful for navigation architectures containing independent functions.			method for establishing design assurance levels and may be used to show compliance with this requirement. This guidance provides an acceptable method for establishing a design assurance process by taking into account the overall aircraft operating environment and the independent functions of the aircraft's systems.
ANM-100	Page A2-15 Para A2-5.c.  ANM-110 Meyers	Delete Note 1.	Note 1 is confusing and gives the impression that the preceding requirement is not a requirement.	See comment.	<b>Partially Accepted.</b> Note 1 changed to read:  <b>Note 1:</b> Directly meeting this requirement can substitute for the general requirement for dual equipment (described above).
G. Schwab ASW-112	Pg 81, para 13-11(e)	Need to include rotorcraft reference for specific interfaces.	Applicants may not realize that rotorcraft have different references for similar systems.	Add reference to TSO-C194 for rotorcraft HTAWS, as well as Miscellaneous Guidance 18 in AC 27-1B and AC 29-2C.	<b>Accepted.</b>

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G. Schwab ASW-112	A7-3, para A7-2 Acronyms	Need to add HTAWS to acronym list for helicopter terrain warning system.	Requirements are different for HTAWS and should be addressed.	Throughout document, wherever TAWS is mentioned, a TAWS/HTAWS should be used.	<b>Partially Accepted.</b> Not all references to TAWS apply to HTAWS; such as mode 5 alerting. HTAWS will be inserted with TAWS where applicable; and, the acronym and TSO references added to Appendix 7.
G. Schwab ASW-112	Pg 103 para 18-3(d)(1)	Need to emphasize this is applicable ONLY to Part 23, Class 1, 2, and 3 and specifically exclude Part 25, 27, and 29.	The example does not include Part 27 or 29.	Add Parts 27 and 29 to the example given, in addition to Part 25 and Part 23 Class IV.	<b>Accepted.</b>