

TSO-C151c (TAWS) Field Comments

Company & Group	Page & Paragraph	Comment	Rationale for Comment	Recommendation	Disposition
Ken Alexander	Page 19 Table 3	Add "or Glide path" in the alerting condition section of Mode 5		Should read: "Ground Proximity Excessive Glide Slope or Glide Path Deviation"	Accepted
Ken Alexander	Page 25 Table 7	Under "FMS" under the FMS/RNAV or GPS Category		Should read: "FMS or GPS"	Not Accepted. Part 121 requires root proving to ensure the navigation systems. That is not required in Part 135.
ASW-100					
N/A	N/A	N/A	N/A	N/A	N/A
AFS-1					
AFS-200	N/A	N/A	N/A	N/A	N/A
AFS-300	N/A	N/A	N/A	N/A	N/A

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AFS-400	N/A	N/A	N/A	N/A	N/A
AFS-800	Page 26 Appendix 2 Paragraph 1.2	“L/O” is not defined in this paragraph, only in the NOTE below	Confusing to the reader	Define the acronym “L/O” in paragraph 1.2, instead of in the note below	Accepted
Larry Newman, ATSI	Page 3 from Change Summary Doc/Paragraph 1 or Page 14 from Field Coordination Doc/Section c. (2 nd Bullet)	“GPS position from the FMS is acceptable as long as the FMS output is based on the GPS position” Does this mean no DME-DME updating allowed?	If so then should it say “...is acceptable as long as the FMS output is based solely on the GPS position?”		Accepted
ANE-100					
ANE-100	N/A	N/A	N/A	N/A	N/A
ANM-100					
Kirk Baker	Page 2, 3. b.	The TSO template requirements remove a key sentence in this paragraph. <i>False sensor inputs (erroneous altitude, terrain data, airport data, etc) to the TAWS computer need not be considered for compliance to these failure conditions.</i>	When performing a proper safety assessment to determine compliance to a failure condition classification of major for TAWS at the box (or TSO level), it is important to recognize that we only require the assessment to address failures and false or misleading conditions that don't include aircraft installation limitations, or terrain data quality limitations that cannot be classified.	Address this in the appendices.	Accepted

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Kirk Baker	Page 9, Appendix 1, Section 2.0 2.3 Caution Alert 2.13 Warning Alert	Update definitions to be consistent with 25.1322 Flight Crew Alerting Rule	Currency with existing definitions	Caution: The level or category of alert for conditions that require immediate flightcrew awareness and a less urgent subsequent flightcrew response than a warning alert. Warning: The level or category of alert for conditions that require immediate flightcrew awareness and immediate flightcrew response.	Partial Accepted: The definitions will read as follows: Caution: conditions that require immediate flight crew awareness and subsequent flight crew response. Warning: conditions that require immediate flight crew awareness and immediate flight crew response.
Kirk Baker	Page 13, Appendix 1, Section 3.3 c. Mode 6 Voice Callouts.	Paragraph has been modified to include a new qualification <i>if landing gear is in the configuration for landing.</i>	This is a new, additional qualification that limits the CFIT protection envelope.	Remove this qualification, or provide clarification for its addition.	Not Accepted. For Class A TAWS systems, the GPWS annunciates gear and terrain warnings if the gear is not in the landing configuration at 500 feet. The 500 foot call is an advisory message used when the aircraft is being operated properly per normal procedures. Since the aircraft is not being operated per normal procedures, the advisory isn't necessarily appropriate. In Class A systems, it could be construed as confusing to the pilot to hear the normal "500" followed by the "too-low gear" and "terrain-terrain."

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Kirk Baker	Page 15, Appendices 1, Section 3.4 c. Mode 2A Bullet 5	This bullet states that the applicant <u>must</u> use high quality data, but provides no minimum standard, i.e. 3 arc seconds.		Consider setting a minimum level of accuracy.	Partial accepted: The word "high quality" will be changed to "sufficient"
Kirk Baker	Page 24, Appendices 1, Section 10.0	Last sentence should be changed to require the deviation process.		Change sentence to: If other definitions for enroute, terminal, and approach are used by TAWS, you must apply for a deviation per section 3.g. of this TSO.	Not accepted: The 'b' version of this document allowed for the use of other definitions. We just added a level of rigor that allows the ACO to approve these definition changes. An approval process that we feel comfortable with allowing an ACO to handle.
FAA, ANM-111	Page 12, Appendix 1, a.	Editorial. Second sentence the word "with" should be "within"		Change "with" to "within"	Accepted
FAA, ANM-111	Page 20, Appendix 1, Table 4	The legend for Table 4 includes "A = Advisory," but there are no "A" entries in the alert Level column - "A" is unused and should be removed from the legend.		Remove "A= Advisory" from the legend	Accepted
FAA, ANM-111	Page 21-21, Appendix 1, Para 5.1	Question. For TAWS without an embedded positioning source, are there any TAWS design considerations/ requirements beyond the TAWS installation instructions for position			Accepted: Section 5 has been rewritten to discuss control of the TAWS inputs. However, this TSO has historically not defined minimum HFOM.

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		source interface? For example, must the TAWS be able to discriminate GPS position figure of merit?			
FAA, ANM-111	Page 24, Appendix 1, para 9.2	Question. If an ‘inhibit status’ annunciation is required for automatic inhibition of Class A functions, why is it not also required for manual inhibits?	The flight crew may forget that the functions were manually inhibited, or one pilot may be unaware that the other inhibited them.	Require “inhibit status annunciation” for both automatic and manual Class A function inhibits.	Accepted
LAACO ANM-160L	Page 22 & 23, Para. 9.1, Manual Inhibit	Section 9.1 states “ Manual Inhibit. Class A equipment must have the capability (e.g., a control switch to the flight crew), to inhibit the FLTA function, the premature descent alert function, and the terrain display. This is required in the event of a navigational system failure or other failures that adversely affect FLTA, the premature descent alert function, or the terrain display.” should be changed to allow the option of keeping the terrain display active (not shutdown) while the switch is activated.	<p>This section, unchanged from the previous version (C151b), has been a source of contention between various aviation authorities. The way the section is written, it was interpreted by EASA (UK CAA) that when the inhibit switch is on, the FLTA, PDA functions AND the terrain display must be removed from pilot’s view.</p> <p>While removing the display in the event of a navigational system failure is necessary, it would be detrimental to pilots’ situation awareness and therefore potentially their safety to remove the terrain display when the Inhibit is used for other purposes such as to avoid unwanted (nuisance) alerts.</p> <p>Both TAWS Advisory Circulars 23-18 and 25-23 requires an AFMS limitation that states: “To avoid giving unwanted alerts, the TAWS must be inhibited when landing at an airport that is not included in the airport database.” For this reason, most of the time, the TAWS Inhibit switch is used to avoid nuisance alerts, where the TAWS</p>		Accepted: Wording will read: The TAWS system must have a capability (e.g., a control switch to the flight crew) to manually inhibit the TAWS (FLTA/PDA) aural alerts, visual alerts, and the terrain display. If the TAWS system incorporates an automatic inhibit function that automatically inhibits TAWS (FLTA/PDA) aural alerts, visual alerts, and terrain display when a position source is faulted or unavailable, then the manual inhibit may be designed to only inhibit aural and visual alerts. This alternate manual inhibit functionality will allow pilots to disable the

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			<p>display is perfectly OK and not because of a navigational system failure.</p> <p>The TSO should give manufacturers an option to design their system to retain the terrain display for cases when navigational system failure is not the reason for activating the “TAWS Inhibit” function.</p>		<p>TAWS alerting without removing the terrain display when landing at a site not included in the database or landing at a site that generates known nuisance alerts. The “inhibit status” must be announced to the flight crew.</p>
ACE-100					
ACE-180 – Diane Millam	General	<p>The part marking requirements for TSO articles - i/a/w with the regulatory changes made to 14 CFR, part 21, effective on April 14, 2010 are moved to 14 CFR, part 45 with a <i>compliance</i> date of April 16, 2011.</p> <p>Since these draft documents were not signed prior to the compliance date, the new regulatory reference in any revised TSO document and in Order 8110.49 and in any other draft document or draft Order that references TSO marking with reference to 21.607 should be revised to state to mark the articles in accordance with part 45 Subpart B - Marking of Products and Articles, subpart 45.10 Marking. Marking requirements for PMA articles, TSO articles and Critical parts</p>			<p>Partially accepted. This TSO does not specifically reference the paragraph in regards to marking, it references Subpart O. The Subpart O changes that became effective on April 16, 2011 refer the TSO holder/applicant to Part 45 for part marking. Part 21, Subpart O, Paragraph 616(d), Amdt. 21-92, Eff. 4/16/2011 reads: “(d) Mark the TSO article for which an approval has been issued. Marking must be in accordance with part 45 of this chapter, including any critical parts;” Therefore, no change will be made to this TSO in this regard.</p> <p>AIR-120 was forwarded your</p>

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		<p>and marked requirements as noted i/a/w subsection 45.15 (b).</p> <p>Another side note concerning the part 21 changes: the PMA marking reference also changed to part 45 Subpart B - Marking of Products and Articles, subpart 45.10 Marking. subsection 45.10 (a) and marking requirements are covered by subsection 45.15(a) for PMA.</p>			<p>comment in regards to existing TSO's and Order 8150.1b – Technical Standard Order Program. They responded that they are working on a Policy Memo to address these issues until a change or revision to the Order can be published. They are also developing a method to address existing TSOA's that contain CFR references that have changed.</p>
ACE117C: BO	Page 2, Paragraph 3(e) and 3(f)	Remove phrase, "...with exception of any reference requiring involvement of the certification authorities," from both paragraphs.	We strongly object to the proposed wording in Paragraph 3(e) and 3(f). This wording is not consistent with the TSO template, and it may be misinterpreted to mean that the software and airborne electronic hardware data does not have to be reviewed by the FAA. The plan for software aspects of certification (PSAC), software configuration index, software accomplishment summary, plan for hardware aspects of certification (PHAC), hardware verification plan, top-level drawing, and hardware accomplishment summary (or similar document, as applicable) are all listed in the TSO as required technical data. Per Order 8150.1B, paragraph 9(c): "the ACO should determine the adequacy and validity of technical data, procedures, processes, tests, and test results" which includes these software and airborne electronic hardware artifacts. The depth of the ACO review will depend on factors such as the applicant's experience, the complexity of	Use the wording in the TSO template provided in 8150.1B, Change 1. In addition, this wording appears in TSO-C197 and in proposed TSO-AFGCS. These TSO's should be corrected.	Accepted

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			device, and the use of new technologies. The PSAC and PHAC especially should be coordinated with the FAA early in the life cycle process to allow ample time to resolve technical issues and help prevent costly delays in completing the project.		
ACE-114 RH	Page 10 paragraph 3.1	Editorial – extra word in the sentence. “This search volume should vary as a function of phase flight, distance from runway, and the required obstacle clearance (ROC) in order to perform its <i>of</i> intended function and to minimize nuisance alerts.”	Incorrect sentence.	Delete “of” from the sentence.	Accepted
ACE-114 RH	Page 12 Paragraph 3.3	Mode 6, bullet-listed with other modes, has the leading sentence as being included in the TSO-C92c and RTCA/DO-161A. However, as stated in the beginning of the paragraph, TSO-C92 and RTCA/DO-161A only provide functions of Mode 1 through Mode 5. Mode 6 is described in paragraph 3.3.c.	Conflicting information – The leading sentence to the bullet list includes Mode 6, which isn’t described by TSO-C92c, and RTCA/DO-161A.	Reconcile the message in the leading sentence (e.g., Modes 1-5 in TSO-C92c, RTCA/DO-161A, etc.)	Accepted