

**PUBLIC DOCUMENT REVIEW LOG**

<b>Document No.:</b> TSO-C139a Aircraft Audio Systems and Equipment		<b>2. Project Lead:</b> Steve Ramdeen	<b>3. Reviewing Office (Name and Phone Number):</b> AIR-130/202-385-4883	<b>4. Due Date:</b> 01/31/2014	<b>5. Date of Public Disposition:</b> 02/03/2014	
<b>Item No:</b>	<b>Page and Paragraph No:</b>	<b>Commenter</b>	<b>Comment:</b>	<b>Reason:</b>	<b>Recommendation:</b>	<b>AIR-100 Disposition:</b>
1	Pg 3 Para 5a2	Jim Buehring, Cobham Aero	What does it mean by “Describe in detail any deviations”? Does it mean “deviations from this TSO standard”, or “deviations in the manual from the ATA spec”, or ??	Unclear wording	Recommend clarification in the wording of this section.	Not Accepted Template Language, this information will be considered for future revisions
2	Pg. 4 Para 5a7	Jim Buehring, Cobham Aero	By “list of replaceable components”, does it mean “list of line replaceable components (LRUs)” or “list of all components that may be replaced if the unit is repaired”. If it means the latter, then the addition of “Include vendor part number cross references, when applicable” might imply that whenever we add a new vendor part number to our database, we would have to assess which TSO’d articles are affected and resubmit that vendor p/n data to the FAA. We don’t currently submit that data.	Unclear intent	Recommend clarification in the wording of this section.	Not Accepted Template Language, this information will be considered for future revisions
3	Pg. 5 Para 5f 5&6	Jim Buehring, Cobham Aero	We are a bit concerned by the requirement to provide test plans, analysis and results to verify the function and performance of non-TSO functions. Under our current internal standard operation practices this is a requirement, however we leave the method	General Understanding	Recommend clarification in the wording of this section	Not Accepted Template Language, this information will be considered for future revisions

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			<p>and level of verification up to the design team.</p> <p>Is the intent here that the FAA will be able to reject a TSO application if the level of testing of non-TSO'd functions is considered inadequate .. and if so, what standards will be used to assess whether the degree of verification is adequate? For instance, backlighting on a radio panel is a non-TSO'd function .. what level of test will the FAA consider adequate to show that the radio backlighting satisfies its requirements?</p>			
4	Pg. 6 6i	Jim Buehring, Cobham Aero	<p>Item 6i states that for non-TSO'd functions the applicant has to provide the evidence in para 6a through 6h (including results of environmental qualification tests). Does this imply that the non-TSO functions must operate under the environmental conditions, and that qualification testing is needed to demonstrate this? DO-214A describes what level of functionality is required when testing TSO'd functions, but not sure it says the same for non-TSO'd functions. As an example, what if a digital audio control system had an emergency mode which was not tested under all environmental conditions since it was not a</p>	General Understanding	Recommend clarification in the wording of this section	Not Accepted Template Language, this information will be considered for future revisions

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5	Pg. 2, 3d	Jim Buehring, Cobham Aero	function required by TSO? Env Qualification using a specific current standard such as DO160 G in this section would then require the FAA to approve deviations for any higher and more current RTCA/DO-160 standard used. New standards should be acceptable they will always ensure the highest level of safety.	Time savings for applicant and FAA ACO's.	Allow the use of RTCA/DO-160 G or later approved revision	Not Accepted, Please see A/C 21-16G for interchangeability.
6	Pg. 2, 3e	Jim Buehring, Cobham Aero	Software Qualification using a specific current standard such as DO-178B in this section would then require the FAA to approve deviations for any higher and more current RTCA/DO-178 standard used. New standards should be acceptable they will always ensure the highest level of safety and since the FAA now highly recommends use of D178C.	Time savings for applicant and FAA ACO's.	Allow the use of RTCA/DO-178 B or later approved revision	Not Accepted Template Language, this information will be considered for future revisions
7	Pg 3,4.	Jim Buehring, Cobham Aero	The statement below  "As required by the TSO, the following statement must be furnished with each manufactured unit:  "The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on	If the FAA just wants the ACO's to have to remember to add it to each approval letter there is human error possible. If not added to the TSO the holder will not be required to add the statement. If on the TSO, then all audio TSOA holders will have to add this whether it's on their approval letter or not.	Consider adding the statement to TSO. I understand that a TSO is a minimum standard and that all items cannot or should be added to the TSO itself but just wanted this to be a thought by the review committee. May be too restrictive however.	Not Accepted Template Language, this information will be considered for future revisions

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			<p>or within a specific type or class aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR Part 43 or the applicable airworthiness requirements".</p> <p>was not identified in TSO-C139A Draft. I would have thought that for the FAA to make this a new TSO requirement going forward on TSO's as stated, it would be included perhaps somewhere in the requirements in the TSO even though it is not an actual marking requirement.</p>			
8	Page 5 Paragraph 6.h.	Serdar KURT	Besides the data given directly to the responsible ACO, technical data which shall be had available for review by the responsible ACO, is not specified or covered for the cases which the failure condition classification is less than major and the article includes complex custom airborne electronic hardware.	Lack of coverage in the applicable scope for the airborne electronic hardware classification	If the failure condition classification is less than major and the article includes complex custom airborne electronic hardware, the following data shall be had available for review by the responsible ACO: test cases or procedures, test results, test coverage analysis, tool assessment and qualification data, and configuration management records, including problem	Not Accepted Template Language, this information will be considered for future revisions

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					reports. (such as specified for simple custom airborne electronic hardware)	
9	Page 5-Para 6g		Old version of RTCA/DO-178 is defined in the TSO-C139a	Not current version	Change the RTCA/DO-178B to RTCA/DO-178C	Not Accepted Template Language DO-178C as not been accepted by the FAA
10	Para. 2(b)	Cessna Aircraft Company	No guidance is provided for determining the “the loss of function and malfunction failure condition classification”	Add a reference to ARP4761, AC23.1309-1 and AC25.1309-1		Not Accepted Template Language, this information will be considered for future revisions
11	General	Cessna Aircraft Company	Multiple 14CFR regulations cited (e.g. 14CFR23.603) without amendment level. The TSO interpretation depends on a specific amendment level	Add amendment levels to quoted regulations.		Not Accepted Template Language, this information will be considered for future revisions
12	Page 1, par 3.b.	Garmin	Paragraph 3.b states:  Document the loss of function and malfunction failure condition classification.  This language is vague.	The language for this requirement does not provide guidance on where to document the failure condition classification.	Provide guidance on where the documentation of failure condition classification should be captured, e.g. Installation Manual, Plans, etc.	Not Accepted Template Language, Failure Condition Classification is Installation dependent
13	Page 2, par 3.d.	Garmin	Paragraph 3.d states:  ...however, you may use a different standard environmental condition and test procedure than RTCA/DO-160G, <b>provide</b> the standard is appropriate for aircraft audio systems and equipment.	The language for this paragraph reads like a requirement to submit information, but it is believed that the objective is to provide a constraint on the utilization of a different environmental standard.	Update word “provide” to “provided”	ACCEPTED

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			This language is confusing.			
14	Page 3, par 4.b.(2)	Garmin	Paragraph 4.b.(2) states:  Each subassembly of the article that you determined may be interchangeable.  This language is confusing.	The language for this requirement is confusing. This could mean that a stuffed printed circuit board needs the TSO number.	Suggest removing the statement or if removing causes problems, work with industry to establish wording that is better understood.	Not Accepted Template Language, this information will be considered for future revisions
15	Page 4, par 5.f	Garmin	TSO paragraph 5.f and its subparagraphs define required information to be supplied to the ACO for a non-TSO function. This guidance is inconsistent with Order 8110.4C CHG 4.	TSO paragraph 5.f indicates that “you must ... include the following information with your TSO application” but the TSO 5.f subparagraphs which specify the required information to be supplied to the ACO for a non-TSO function are inconsistent with the Order 8110.4C CHG 4 paragraph 6-9.b.(3) “Manufacturer Data Submittal” requirements. For example, TSO paragraphs 5.f.(5) and 5.f.(6) require submittal of “Results of test/analysis” while Order 8110.4C CHG 4 paragraph 6-9.b.(3) requires submittal of “proposed test procedures”; while both sets of guidance use the word “test”, otherwise there is no similarity.	Adjust the wording in the TSO (template) to be consistent with the 8110.4C CHG 4 intent.	Not Accepted Template Language, this information will be considered for future revisions
16	Page 4, par 5.f	Garmin	TSO paragraph 5.f and its subparagraphs include definition of non-TSO functions and the data to be submitted to the ACO for non-TSO functions. This guidance is inconsistent with	TSO paragraph 5.f states “Identify functionality or performance contained in the article not evaluated under paragraph 3 of this TSO (that is, non-TSO	Adjust the wording in the TSO (template) to be consistent with the 8110.4C CHG 4 intent.	Not Accepted Template Language, this information will be considered for future revisions

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			Order 8110.4C CHG 4.	functions).” Use of the term “performance” in the definition of a non-TSO function is inconsistent with the Order 8110.4C CHG 4 paragraph 6-9.b.(1) and 6-9.b.(3)(a) guidance regarding how to define a non-TSO function. The issue is non-TSO should not be defined as “performance”. It will create difficulty if these criteria are used. For example, if a TSO requires a minimum 10 watt transmitter and a company makes equipment that is robust at 11 watts, the performance exceeding the TSO is not called out under the TSO; consequently, by the paragraph 5.f “performance” definition, the 11 watt transmitter has a non-TSO 1 watt capability. The distinction of a “function that can be accomplished outside the TSO box” as is specified in Order 8110.4C CHG 4 paragraph 6-9 is critical to making non-TSO function work long term.		
17	Page 6, par 7.b	Garmin	TSO paragraph 7.b contains wording that is inconsistent with Order 8110.4C CHG 4.	TSO paragraph 7.b includes additional guidance about what furnished data should be provided to an operator or	Adjust the wording in the TSO (template) to be consistent with the 8110.4C CHG 4 intent.	Not Accepted Template Language, this information will be considered for

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				repair station when the equipment includes a non-TSO function. The problematic guidance states “include one copy of the data in paragraphs 5.f.(1) through 5.f.(4).” This guidance is inconsistent with Order 8110.4C CHG 4. Order 8110.4C CHG 4 paragraph 6-9.b.(6) defines the FAA-industry agreed data that must be provided to an installer when equipment includes a non-TSO function.		future revisions
18	Page 1, par 3.b.	Garmin	Paragraph 3.b states:  Document the loss of function and malfunction failure condition classification.  This language is vague.	The language for this requirement does not provide guidance on where to document the failure condition classification.	Provide guidance on where the documentation of failure condition classification should be captured, e.g. Installation Manual, Plans, etc.	Not Accepted Template Language, Failure Condition Classification is Installation dependent
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