#	Commenter	Page & Para. No.	Comment	Reason for Comment	Suggested Change	Comment Resolution
1.	Embraer S.A.	pg 2, paragraph 3(f)	The TSO should reference DO-178C, which is the latest revision. It may be more appropriate to reference AC 20-115 as revised, as it will always mention the most recent version of the DO which is accepted by the FAA.	There are multiple references to an outdated version of the RTCA standard.	**f. Software Qualification.** If the article includes software, develop the software according to the version of RTCA, Inc. document RTCA/DO-178, *Software Considerations in Airborne Systems and Equipment Certification*, referenced in AC 20-115, as revised, to at least the software level consistent with the failure condition classification defined in paragraph **3.c** of this TSO.	**Comment Not Accepted.** The FAA encourages use of DO-178C for software development. However, FAA TSOs will continue to state use of DO-178B until Order 8150.1C is revised. Applicants may use DO-178C with an approved deviation. Your Aircraft Certification Office (ACO) can grant this deviation to help expedite the deviation approval process.

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2.	Embraer S.A.	pg 5, paragraph 6(g)	The TSO should reference DO-178C, which is the latest revision. It may be more appropriate to reference AC 20-115 as revised, as it will always mention the most recent version of the DO which is accepted by the FAA.	There are multiple references to an outdated version of the RTCA standard.	**g.** If the article includes software, the appropriate documentation defined in the version of RTCA/DO-178 referenced in AC 20-115, as revised, including all data supporting the applicable objectives in its annexes.	**Comment Not Accepted.** The FAA encourages use of DO-178C for software development. However, FAA TSOs will continue to state use of DO-178B until Order 8150.1C is revised. Applicants may use DO-178C with an approved deviation. Your Aircraft Certification Office (ACO) can grant this deviation to help expedite the deviation approval process.
3.	Garmin	Page 1, par 2.a	Section 2.a allows only 18 months after the effective date of this new TSO revision for all products in development against the previous revision to be completed and receive approval against the previous revision.	18 months is a relatively short grace period for products where development cycles can easily exceed 2 years.	Products being developed against the previous TSO revision should be allowed 24 months from the new TSO revision release to finish all qualification and approvals against	**Comment Not Accepted.** The change to an 18 month grace period for a previous TSO to remain effective was data driven based on industry surveys and review of our historical records.

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					the previous TSO revision the product was designed and developed against. Garmin appreciates the recent TSO template change to allow 18 months over the previous 6 months, but we believe 24 months is more in line with industry standard development cycles of 2 to 3 years.	
4.	Garmin	Page 2, par. 3.c	Includes the statement: (1) Failure of the function defined in paragraph 3.b is a minor failure condition. (2) Loss of the function defined in paragraph 3.b is a minor failure condition. (3) Design the system to at least this failure condition classification.	It is reasonable to clarify the wording to ensure aircraft level analysis is the driver for determining failure classifications. EASA has recognized this using the following wording in ED	We recommend that no failure classification/DAL requirement be included in the TSO or at most provide the following general guidance:	**Comment Not Accepted.** A "minor" failure condition for this TSO is in accordance with FAA guidance and policy.

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			Wording needs to change to recognize the fact that failure condition classification is ultimately determined by aircraft level analysis.	Decision 2010/010/R 14/12/2010 Annex I Subpart A – General 2.4 Failure condition classification: "Develop the system to, at least, the design assurance level equal to the failure condition classifications provided in the ETSO. Development to a lower Design Assurance Level may be justified for certain cases and accepted during the ETSO process but will lead to installation restrictions." Additionally, it is difficult to understand what impact a DLR failure can have on the aircraft, crew or	"To assist with ensuring recorded information is available for accident investigation, we require the design assurance for the function defined in paragraph 3.b of this TSO to be commensurate with a minor failure condition even if the installation assesses the equipment failure to have no safety effect." EASA agreed with the above concept in the equivalent ETSO, see comment 27 in CRD 2009-11. A note was added	

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				passengers that would drive the determination that the DLR function warrants a minor failure condition instead of no safety effect. However, there may be a desire to require design assurance equivalent to a minor failure condition for other reasons such as ensuring the recorded information is available to assist with an accident investigation.	detailing why the design assurance level of minor was needed.	
5.	Garmin	Page 2, par 3.f	Section 3.f "Software Qualification" requires compliance with DO-178B.	AC 20-115C also allows DO-178C to be used to show compliance for the software aspects of airborne systems.	Similar to the wording in Section 3.e an additional statement should be added to allow use of 178B or 178C as appropriate. Suggest rewording to "If	**Comment Not Accepted.** The FAA encourages use of DO-178C for software development. However, FAA TSOs will continue to state use of DO-178B until Order 8150.1C is revised. Applicants may use DO-178C with an approved deviation. Your Aircraft Certification

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					the article includes software, develop the software according to RTCA, Inc. document RTCA/DO-178B, Software Considerations in Airborne Systems and Equipment Certification, dated December 1, 1992, to at least the software level consistent with the failure condition classification defined in paragraph 3.c of this TSO. You may use a different software development standard than	Office (ACO) can grant this deviation to help expedite the deviation approval process.

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					DO-178B, in accordance with AC 20-115C, provided the software development standard is appropriate for Airborne Systems and Equipment."	
6.	Garmin	Page 2, par 3	Section 3 is missing an "Electronic Hardware Qualification" guidance section. This section is included in the TSO template but is not in this TSO draft.	This "Electronic Hardware Qualification" requirement should be included in the TSO to provide additional guidance and consistency with other TSOs and latest policy on AEH.	Add the Electronic Hardware Qualification guidance as defined in AC 20-152 paragraph 1.b as this provides guidance in all cases where the AEH is Minor. Include a statement suggesting DO-254 compliance is required for complex AEH above Minor.	**Comment Not Accept.** TSO-C177a has a "minor" failure condition classification therefore; the requirement to develop the Airborne Electronic Hardware in accordance with RTCA/DO-254 is not levied.

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7.	Garmin	Page 3, par 4.b.(2)	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.	**Comment Not Accepted.** The language and policy detailed in paragraph 4.b.(2) is standardized per FAA Order 8150.1C.
8.	Garmin	Page 4, par 5.e	TSO paragraph 5.e 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.e indicates that "you must … include the following information with your TSO application" but the TSO 5.e 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	Adjust the wording in the TSO (template) to be consistent with the 8110.4C CHG 4 intent.	**Comment Not Accepted.** The language and policy detailed in paragraph 5.e is standardized per FAA Order 8150.1C.

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				example, TSO paragraphs 5.e.(5) and 5.e.(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.		
9.	Garmin	Page 4, par 5.e	TSO paragraph 5.e includes definition of non-TSO functions. This guidance is inconsistent with Order 8110.4C CHG 4.	TSO paragraph 5.e states "Identify functionality or performance contained in the article not evaluated under paragraph 3 of this TSO (that is, non-TSO functions)." Use of the term "performance" in the definition of a non-TSO function is inconsistent with the Order 8110.4C CHG	Adjust the wording in the TSO (template) to be consistent with the 8110.4C CHG 4 intent.	**Comment Not Accepted.** The language and policy detailed in paragraph 5.e is standardized per FAA Order 8150.1C. Use of the word "performance" is not intended to change the meaning of non-TSO function, nor make the TSO inconsistent with guidance in Order 8110.4C Change 4. The FAA agrees with the Garmin example. Implementing an 11 watt transmitter where the TSO

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				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.e "performance" definition, the 11 watt transmitter has a non-TSO 1 watt capability. The distinction of a "function that can be		requires 10 watts is not considered Non-TSO functionality.

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				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.		
10.	GE Aviation, William Peterson	3.a	Should the FDR Annex II-B be excluded from the DLR TSO? Was this intended to exclude Annex IV-B?	To clarify whether Annex IV-B is applicable to DLR TSO or not.	Change "Annex II-B" to "Annex IV-B"	**Comment Accepted.**
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