

**Clearance Record  
Public COMMENT LOG**

<b>Originating Office:</b> AIR-132	<b>Document Description:</b> TSO-C119e TCAS II with Hybrid Surveillance	<b>Project Lead:</b> Steve Plummer, 650-756-0227 x166	<b>Reviewing Office:</b>	<b>Date of Review:</b>
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Index No.	Name of Reviewer	Page & Paragraph	Comment	Rationale for Comment	Recommendation	Disposition
1	AIRBUS	5.k	A “failure annunciation on the flight deck” associated to hybrid surveillance should not necessarily be required.	Loss of Hybrid surveillance has no operational impact but only a 1030/1090Mhz freq spectrum impact. Consequently Airbus does not recommend alerting the pilot upon an Hybrid surveillance issue as active surveillance is kept. We must refrain from annunciating loss of hybrid surveillance to the flight crew and especially airborne.	Airbus would recommend mentioning that a maintenance message is appropriate to alert about loss (or failure) of Hybrid Surveillance. In any case, when airborne, failure annunciation to the flight crew should be removed.	<b>Not accepted.</b> The commenter suggests adding mention of a fault alerting integration scheme. The FAA believes the means of annunciating or monitoring for a failure condition is not appropriate for a technical standard order (TSO) as the TSO is an equipment standard not installation guidance. The commenter is invited to review AC 20-151B as it provides detailed guidance for ensuring continued airworthiness.  AC 20-151B, para 2-21, Maintenance Considerations for Hybrid Surveillance Functionality (TSO-C119d only), describes three methods that could be used to ensure the continued airworthiness of the functionality. Since the AC is guidance material, an applicant is not constrained to choosing from one of those three.

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2	AIRBUS	5.k	"scheduled maintenance task" should not necessarily be required	Loss of Hybrid surveillance has no operational impact but only a 1030/1090Mhz freq spectrum impact. Consequently Airbus would prefer to have a Class1 maintenance message pop up sent on maintenance system upon loss of hybrid surveillance instead of a "scheduled maintenance task". A "scheduled maintenance task" seems not to bring value added in comparison with a Maintenance message. We also have to keep in mind that issue "unjustified RA" that has been detected in Europe by Eurocontrol would never had been detected by any maintenance task or any maintenance message or any failure annunciation.	Airbus would recommend mentioning that a maintenance message is appropriate to alert about loss (or failure) of Hybrid Surveillance.	<b>Not accepted.</b> See Index No. 1.
3	Garmin	Page 1, par. 3.b	<p>Wording needs to change to recognize the fact that failure condition classification is ultimately determined by aircraft level analysis.</p> <p>Failure of the function defined in paragraph 3.a of this TSO is a hazardous/severe-major failure condition. Develop the TCAS II to at least the design assurance level equal to this failure condition classification.</p>	<p>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 Decision 2010/010/R 14/12/2010 Annex I Subpart A – General 2.4 Failure condition classification:</p> <p>"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."</p>	Re-work this section to match the EASA wording. Or work with industry to develop an agreed to wording.	<b>Not accepted.</b> The language in this section is dictated by the TSO template in FAA Order 8150.1C CHG 1 dated 5/10/12.

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4	Garmin	Page 2, par 3.f	Including this specific DO-254 reference is redundant to the rest of the paragraph in this section.  For custom airborne electronic hardware determined to be simple, RTCA/DO-254, paragraph 1.6 applies.	DO-254 makes it clear how to address “simple” custom airborne electronic hardware.	Remove this reference to DO-254 Paragraph 1.6.	<b>Not accepted.</b> The language in this section is dictated by the TSO template in FAA Order 8150.1C CHG 1 dated 5/10/12.
5	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.	<b>Not accepted.</b> The language in this section is dictated by the TSO template in FAA Order 8150.1C CHG 1 dated 5/10/12. Template language covers a broad range of articles. However, it is not the intent of this TSO for every “stuffed printed circuit board” to contain a TSO number.
6	Garmin	Page 4, par 5.f.(1)	This paragraph requires reporting the “failure condition classification” which can be misleading and is inconsistent with the process of determining failure condition classification at the aircraft level.	Failure condition classification is determined by system safety assessment at the aircraft level and can vary based on installation. By providing a failure condition classification at the appliance level this creates an impression that the safety analysis for these functions is complete.  Additionally, TSO paragraphs 5.4.(a) and 5.4.(b) already require the Manual(s) to contain the software and AEH design assurance levels that an installer needs to determine whether the equipment can support the aircraft level failure condition classification.	Remove the requirement to list “failure condition classification”.	<b>Not accepted.</b> The language in this section is dictated by the TSO template in FAA Order 8150.1C CHG 1 dated 5/10/12.

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7	Garmin	Page 4, par 5.f	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 Order 8110.4C CHG 4.	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 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.	Adjust the wording in the TSO (and template) to be consistent with the 8110.4C CHG 4 intent.	<b>Not accepted.</b> The format of paragraph 5.f is dictated by the TSO template. However, the apparent disconnect between the two Orders (8110.4C CHG4 and 8150.1C CHG 1) is noted. It is not the intent of this TSO to create difficulty with respect to non-TSO function definition(s). The example cited should not be a non-TSO “function” but should be documented in the TSO application (in this case, for interaction with other equipment at installation).

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8	Garmin	Page 6, par 7.b	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 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.	Adjust the wording in the TSO (and template) to be consistent with the 8110.4C CHG 4 intent.	<b>Not accepted.</b> It is not the intent of this TSO to create difficulty with respect to non-TSO function definition(s). The example cited should not be a non-TSO “function” but should be documented in the TSO application (in this case, for interaction with other equipment at installation).

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9	Garmin	Page 10, Appendix 2, Paragraph 1.1	<p>The following requirement is ambiguous and incorrect:</p> <p>“TCAS II units must provide a means for presenting logged hybrid surveillance faults to maintenance personnel to enable on-wing monitoring of hybrid surveillance functionality at periodic intervals.”</p>	<p>First, a requirement should use the word “shall”.</p> <p>Second, the requirement is ambiguous, as there is not definition of “faults” elsewhere in RTCA/DO-300A. Section 2.2.10 discusses status and/or failure of own aircraft latitude and longitude, own ship ground speed, own ship horizontal position integrity, and own ship horizontal uncertainty. To aid in maintenance operations as noted, it seems that only occurrences that cause disabling of passive surveillance should be logged.</p>	<p>Use the word “shall” rather than “must”.</p> <p>Clarify the definition of “faults”.</p>	<p><b>Partially accepted.</b></p> <p>The requirement has been revised to now use the word “shall” in place of “must.”</p> <p>Regarding a definition of what constitutes a fault, the failure of the hybrid surveillance functionality by design will <u>not</u> lead to a TCAS failure. This design feature precludes a GPS outage from disabling TCAS on own ship (and any proximate aircraft so equipped which would be affected by the outage). This will ensure that collision avoidance remains functional on own ship and any other TCAS equipped aircraft with the hybrid functionality if and when a GPS outage occurs. For the purposes of ensuring continued airworthiness of the hybrid surveillance functionality, the commenter is correct that only faults causing a failure of the hybrid surveillance function need to be logged. That provides a means for later presentation of the faults to maintenance personnel. The FAA believes the TCAS II manufacturers are qualified to make that determination and implement a fault logging scheme of their own design. This TSO does not prohibit manufacturers from incorporating maintenance logging for other types of faults.</p>