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5 December 2019

Special Committee 147

MINIMUM OPERATIONAL PERFORMANCE STANDARDS FOR TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEMS AIRBORNE EQUIPMENT

The 95th meeting of RTCA SC-147 and 64th meeting of EUROCAE WG-75 was held on 5 December 2019 at RTCA Headquarters, Washington, DC.

The following Leadership was present:

J. Stuart Searight	Co-Chairman, Federal Aviation Administration
Ruy Brandao	Co-Chairman, Honeywell, SWG Co-Chairman
Bill Booth	Co-Chairman, EUROCAE WG-75
Sheila Mariano	Government Authorized Representative
Donna Froehlich	Secretary, Aurora Innovations
Al Secen	Director RTCA
Alex Engel	Director EUROCAE

Agenda Thursday, 5 December (as amended)

1. Chairmen's Opening Remarks / Introductions
2. Anti-Trust Statement & RTCA/EUROCAE Policies
3. Approval Of Minutes: 94rd Meeting of RTCA SC-147/63rd Meeting of EUROCAE WG-75 | 19 Sep 2019
4. Approval of Agenda: 95th Meeting of RTCA SC-147/64th Meeting of EUROCAE WG-75 | 5 Dec 2019
5. Future Meeting Scheduling
6. Out-Brief on Pre-FRAC Comment Resolution Status and Plan Forward
   a. Surveillance (SWG)
   b. Threat (TWG)
7. Interoperability MASPS Approval Status and Schedule
   a. Coordination Working Group (CWG)
8. European Validation Activities Status
9. FAA 1090MHz Spectrum Mitigation Report – Jim Baird, FAA/ANG-B
10. Rulemaking status update from FAA and EASA certification offices
    a. Change Proposal to DO-385
    b. Rulemaking status from FAA and EASA certification offices
11. Action Items Summary
12. Adjourn

Note: All presentations from the agenda items summarized below can be found on the RTCA Workspace (**http://workspace.rtca.org/kws**) in the SC-147 Traffic Alert & Collision Avoidance System area.

Agenda Item 1-5. – Opening Plenary Session

1. Chairmen's Opening Remarks / Introductions
   Mr. Stuart Searight opened the 95th Plenary of SC-147, 64th meeting of EUROCAE WG 75. Mr. Searight noted that sXu working meetings were to follow the Plenary this, Thursday, afternoon and Friday morning. He added, even though CAS for small UAS is still a proposed item for our TORs, it is important to continue to reach out and coordinate among the major stakeholders.

2. Anti-Trust Statement & RTCA/EUROCAE Policies
   Mr. Al Secen reviewed the anti-trust statement and basic committee policies. Then, Mr. Alex Engel thanked RTCA for hosting meeting and reinforced that EUROCAE has the same anti-trust policies as RTCA. Mr. Engel then reviewed the reciprocal membership agreement between RTCA and EUROCAE.
3. Approval of Minutes from: 94th Meeting of RTCA SC-147/63rd Meeting of EUROCAE WG-75 | 19 September 2019
   Mr. Searight asked if there were any questions or comments on the September Plenary minutes, as there were none, he asked if the committee would approve the minutes. Mr. Walter Bender moved the August Plenary minutes be approved; Mr. Ruy Brandao seconded. The committee approved the minutes from September Plenary.

4. Approval of Agenda: 95th Meeting of RTCA SC-147/64th Meeting of EUROCAE WG-75 | 5 Dec 2019
   There were no significant corrections to the agenda from committee members. Mr. Searight pointed out that there might be a minor adjustment to the order to accommodate guest presenters. Mr. Searight also indicated the Rulemaking agenda item would include a discussion on a Change Proposal that Aircraft Certification and the Program Office would like the committee to deliberate on. If accerptable to the committee, this Change will be included in the upcoming TSO for ACAS Xa/Xo and also included in any future published DO-385 Change document.
   There were no comments or objections and the amended agenda was approved.

5. Future Meeting Scheduling

Year	Dates	City	Venue	Host Organization	Focus
2020	March 10-13	Phoenix, AZ	Drury Inn and Suites, Happy Valley (WGs w Plenary)	ACSS w/ RTCA WebEx	Review Final Performance of ACAS Xu; Approve FRAC/OC of ACAS Xu MOPS Coordination with sXu efforts
2020	June 1-4	Seattle, WA*	FAA Western Regional Office* (WGs w Plenary)	RTCA	Address ACAS Xu FRAC/OC comments Approval of ACAS Xu MOPS Coordination with sXu efforts
2020	Sep 14-17	Washington, DC	RTCA Headquarters (4th floor	RTCA	WGs w Plenary Final ACAS Xu Acceptance DAA Coordination Coordination with sXu efforts
2020	Dec 8-10	Washington, DC	RTCA Headquarters	RTCA	
		* Updated venue, see email and visitor information			

Item 6. Out-Brief on Pre-FRAC Comment Resolution Status and Plan Forward

6. ACAS Xu MOPS Pre-FRAC Comment Resolution
    a. Surveillance (SWG) – Jessica Lopez
    Ms. Lopez provided a brief report highlighting several key points. Ms. Lopez began by summarizing the progress from the Working Meetings this week: the SWG reviewed all the comment dispositions. During the working meeting on Tuesday, SWG discussed some outstanding question on RADAR. During this discussion, the TCAS/ACAS PO confirmed the RADAR data accuracy results "hold" were good. The SWG discussed providing a RADAR appendix for the ACAS Xu MOPS. Continuing, Ms. Lopez indicated there is a potential change to Geometric Altitude. She added that there is some remaining research to do and asked Matt Haskins to take concerns back to the Combined Surveillance Committee (CSC). Ms. Lopez also indicated that SWG intends to look at correlation performance with ACAS Xu; she added: "all-in-all we are in good shape." SWG will meet next Tuesday (10 December 2019) to continue with the updates resolving the MOPS comments.
    b. Threat Working Group (TWG) – Charles Leeper
    Mr. Charles Leeper reported the TWG has made substantial progress addressing MOPS comments. He indicated that SWG and TWG will have a joint teleconference/WebEx to discuss the 10 remaining items that warrant further discussion in a joint meeting format. Mr. Leeper then continued that there are two non-concurs which were discussed on Wednesday afternoon (4 December 2019). Mr. Searight noted that the comments were not asking for changes to scope or corrections to algorithms, but asking about the validation of the algorithms and the operational suitability of RWC in European airspace. Mr. Searight added that this committee had noted that since WG-105 and SC-228 are not joint, there might be some need for reverse engineering of some DAA /RWC concepts in the European airspace. Mr. Searight asked Mr. Dean, Mr. Booth and Mr. Engel if there was any insight that WG-75 could provide. Mr. Dean pointed out that the committee agreed to provide some information regarding scope to the commenters. Mr. Booth added that non-concur was a high warning level for this topic, and prompted a good discussion and initiated actions to address some of the European concerns. Mr. Searight agreed and reminded the committee members that there is little data on UAS in controlled airspace and that would put some limitations on the ability to fully validate Xu in controlled airspace. Mr. Searight hypothesized that it is very likely the community will need to study and assess how the introduction of ACAS Xu (along with the new UAS operations it enables) affect ATC/ATM operations from a suitability perspective. Iterations of the system to improve operational acceptability is always like with such new operations and technologies. Mr. Searight also stressed that it is not the committee's burden to validate ACAS Xu in airspaces, for operations, or aircraft performance envelopes or equipage levels that are explicitly defined as out of scope of this MOPS.

Item 7. Interoperability MASPS Approval Status and Schedule

7. Interoperability MASPS RAC Status and Plan Forward – Garfield Dean

Mr. Garfield Dean presented the progress on resolving the FRAC/OC comments on the Interoperability MASPS (and extracted table, below). Mr. Dean explained that the Coordination Working Group (CWG) had made a lot of progress on resolving comments from FRAC/OC. Mr. Dean explained that the comments have generated a lot of has been a lot of detailed discussion, and even debate. He explained that sometimes the conversation has led the CWG to review and update other sections to improve organization and understandability of the document.

	Number	Not Started	In Process	Complete
Non-Concur	7	0	3	4
High	35	7	8	20
Medium	47	10	12	25
Low	54	3	10	41
Editorial	102	0	7	95
Total	**245**	**20**	**40**	**185**

Then Mr. Dean reviewed the resolution status of the more critical, non-concur, comments. There were four con-concurs from Honeywell, submitted by Mr. Walker and three from SAAB submitted by Mr. Erik Petrini and Mr. Bengt-Goran Sundqvist (aka "BeGe"). Mr. Dean began with the comments from Mr. Walker. After some research and discussion with Mr. Walker, the CWG and Mr. Walker agreed one comment was a misunderstanding and Mr. Walker agreed to resolution of providing additional context in that section and earlier in the document. Mr. Dean then proceeded to explain that the other three comments resulted in substantial re-organization of the MASPS in order to provide additional background, context and structure to the document and address the comments. Then Mr. Dean proceeded to the three comments from SAAB. The first comment from SAAB asserted An intelligent agent should be able to use EO/IR technology like a pilot and therefore make uncoordinated collision avoidance maneuvers. Mr. Dean indicated that CWG rejects this recommendation and has discussed this with SAAB. Comments from the committee were in concurrence with rejecting this comment; one participant indicated that if the technology can, in the future, be demonstrated to be sufficiently robust, this might be the basis to propose a change to the MASPS. The other two non-concurs from SAAB were against the statement: "a junior CAS shall (R3.46) not use the ADS-B TCAS RA Broadcast for coordination of RAs." Mr. Dean stated that CSG is working to clarify the objections to using the ADS-B TCAS RA Broadcast, so that anyone wishing to use it knows the issues that need to be addressed (list provided on slide 4 of briefing). Mr. Dean indicated that the other non-concur against this requirements is perceived to stem from SAAB's concern that some active systems might be declared a Junior. The CSG is also actively addressing this concern, and have prepared text indicating problems arising when any active CAS (active interrogation and active coordination) is declared a Junior in hopes to inform Regulators, and other stakeholders, and prevent an active CAS from being declared a Junior.

Mr. Dean reiterated that these non-concurs and other comments generated significant updates to the MASPS in reorganization, as well as clarifying text and explanatory notes. Although the requirements and intent were not substantively changed, the document has undergone sufficient rework to justify a second FRAC/OC period. Mr. Dean then indicated that the CSG proposes a second FRAC/OC in late January timeframe and requests a virtual Plenary to approve the FRAC/OC. Mr. Searight noted that we need to send out comment disposition form several days prior to the virtual Plenary so the committee is prepared to review and discuss any concerns during the virtual Plenary.

The committee then discussed tentative FRAC schedule to ensure proposed dates to ensure the comment period closes prior to the March Face-to-Face (F2F) meeting to allow discussion of new comments at the F2F meetings, and if necessary, to present topics raised for committee discussion. It was noted that if no High or non-Concur comments were received, the committee could approve the Interoperability MASPS in principle, but that we should plan for another virtual Plenary at a later date. Mr. Searight indicated that the goal should be to approve the MASPS no later than the June Plenary.

Item 9. 1090MHz Spectrum Congestion

8. 1090MHz Spectrum Congestion Briefing - Jim Baird

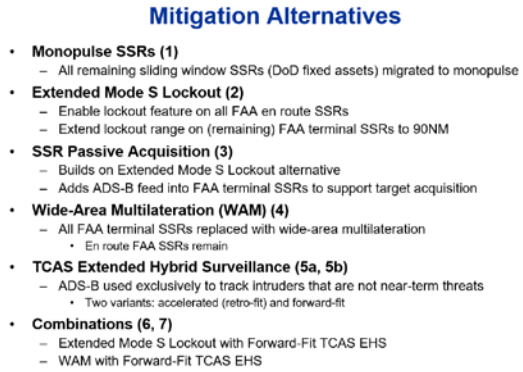
Mr. Jim Baird presented 1090Mhz Spectrum Congestion Mitigation Analysis to SC-147; it was previously briefed to SC-186 on 8 November 2019. Mr. Baird began by providing the goal of the study: to determine the most effective means of mitigating future impacts of 1090 MHz congestion. He indicated that ATM Advisory Committee (ATMAC) requested that FAA assist in resolving the post-2020 congestion issue. The FAA concurred, with ANG-B (Systems Engineering) coordinating the analysis. The analysis was split into two phases:

- Phase 1: Interim assessment of impacts to ADS-B and TCAS, to support SBS risk reduction for 2012 investment decision
- Phase 2: Full assessment of impacts to ADS-B, TCAS, SSRs, and WAM; including sensitivity analyses, and assessments of cost and technical risks (this report)

Mr. Baird indicated the analysis team most constrained airspace for their baseline model. They used the aircraft distribution based on EWR-centered environment during a 2011 flight test. The team used actual ADS-B equipage levels for extrapolating to 2020 and made assumptions on post-2020 traffic and equipage projections. The Subject Matter Expert (SMEs) identified specific parametric expansion of usage to identify the point where spectrum congestion would become an issue. Based on their assumptions, they then modeled various stressing scenarios and simulated impact to the various systems dependent on 1090 MHz and assessed sensitivity to changes in modeling assumptions.

Mr. Baird presented the resulting baseline performance chart (slide 7). He noted: the curves show ADS-B Air-to-Air could tolerate up to 25% more traffic, but that is misleading. Although the EWR base data was from a busy day, busy time period, it is known that seasonal changes can produce a relative worst case of up to 25% more traffic in the area. – Therefore, in seasonal peak periods we are essentially at the limit now.

Mr. Baird then presented seven mitigations that were considered in this analysis:



Mr. Baird presented the results of analyzing the Mitigation Alternatives vs several likely Growth Factors (GFs). One item of note in the analysis results was lower rates of TCAS Extended Hybrid Surveillance (ExtHS) equipage could result in lower mitigation performance for Alt 5a, Alt 6, and Alt 7(GF-0.25). Mr. Baird also indicated that a push for forward fit TCAS will slide mitigation performance to the right in GF (possibly from 1.25 GF to 1.75 GF) as time goes on. Mr. Baird then presented a Life-cycle cost vs performance (graph of cost to implement vs growth factor (GF).

Mr. Baird summarized the technical risks or limitations of the analysis (slides 11 and 12) and then proceeded to the findings and recommendations for mitigating 1090 Spectrum Congestion and its impacts.

The first finding is that ADS-B air-air performance was the most negatively impacted by increases in 1090 congestion (due to increased aircraft density, or to sensitivity cases where congestion increased). Likewise, ADS-B based systems (air-air, air-ground) were the most positively impacted when considering operations in lower density areas (e.g., fewer Mode S aircraft, fewer Single Site RADARs (SSRs) than baseline). He also noted that ADS-B air-ground, ADS-R, WAM more moderately impacted; and the analysis projects minimal impact to TCAS and SSR performance due *solely* to 1090 congestion.

Mr. Baird also presented findings related to specific alternatives included in the analysis. Alternative 5a (Accelerated TCAS ExtHS) and Alternative 7 (WAM + Forward-Fit TCAS EHS) provided the greatest levels of performance improvement. While Alternative 4 (WAM) and Alternative 6 (Extended Mode S Lockout + Forward-Fit TCAS EHS) provided more modest improvements. Additional observations were: Alternative 1 (Monopulse SSRs), Alternative 2 (Extended Mode S Lockout), Alternative 3 (Passive SSR Acquisition), and Alternative 5b (Forward-Fit TCAS ExtHS) provided no significant improvements by themselves, although Alternative 5b can improve over time as equipage increases.

Mr. Baird then proceeded to the Recommendations:

- Require forward-fit equipage of TCAS Extended Hybrid Surveillance (or ACAS Xa) for all aircraft that would be required to carry TCAS II as soon as rulemaking and other required processes will allow.
- Implement WAM on a regional basis where needed. That is, in high-density areas similar to U.S. Northeast Corridor. Assuming ADS-B A3-A3 90NM 12 sec scenario and pending positive outcome of FAA acquisition processes
- Investigate additional alternatives to address ADS-B Air-to-Air impacts such as sectorized antennas, lower required update rates for longer ranges, extended use of TIS-B, etc.
- Resolve known analysis limitations (technical risks)
  Integrate more robust 1030 MHz assessments into analyses
  Collect additional flight test data to validate accuracy of assumptions
  Improve estimates of current and future DoD system contributions
  Investigate congestion impacts in surface environment
- Identify spectrum capacity criteria for NAS service volumes. – Stakeholders need to determine specific growth factor targets to support infrastructure planning
- Coordinate related spectrum analysis activities and maintain consistency and reduce duplication of efforts

Mr. Baird indicated that he would provide the full report to the committee for interested parties. Surveillance Spectrum Congestion Mitigation Alternatives Analysis Report is now available in the SC-147 workspace.

Item 8. Status of European Validation Activities

9. European Validation Activities Status - Garfield Dean and Bill Booth

Mr. Garfield Dean presented the Validation Progress of ACAS Xa in European Airspace.

He began by summarizing the Simulation and Modeling that is complete. The EuroControl - SESAR tasking started with Safety Modeling and completed AVAL (2007 data) and SA01 performance checks. Results were comparable with the FAA Program Office results. The recently developed CRÈME tool has

been undergoing verification and validation with this process and is approaching maturity after 8 iterations. The European team has used the ICAO standard (3-5) pilot response model as well as the non-response model in their analyses. Instead of the U.S.-based simulators, the European effort is using three others: InCAS (a legacy system – no longer supported), CAVEAT (progressively taking over from InCAS) and OSCAR (the Egis Avia system). Mr. Dean indicated multi-aircraft scenarios considered characteristic of European airspace and varied ("typical") pilot responses are still in the works.

Mr. Dean also highlighted the Operational Suitability analysis underway. The analysis is based on 12 months of RADAR data supplied by each of six ANSPs, as well as a European day-to-day encounter model (based on the PASS model). He indicated this would allow them to assess the SESAR acceptability metrics/criteria as well as get feedback from the ANSPs.

Mr. Dean proceeded to remind the Committee that results of the initial study, which ran from January to May 2019, was inconclusive and a follow-on study starting May 2019 with results delivered in late November 2019.

Mr. Dean proceeded on with slides 9 through 17; these provided additional detail on the analysis and observations. Some items of note on those slides are:

- CRÈME safety results comparison with TCAS PO ACAS Xa (MIT LL) results are under investigation – All 100 very close encounters produce at least 1 TCAS II RA but 8 do not have an ACAS Xa RA. This is an item for follow-up discussion. Discussion should include the value, or degree of value, of the TCAS II alerts in these 8 encounters. Mr. Dean noted that this was an earlier ACAS Xa analysis and discussed in pre-FRAC timeframe in Seattle. Mr. Booth wondered how this become a priority 1 metric, indicating the priority is suspect and should be under review.
- Actual pilot response to TCAS II RAs is present in the recorded radar data used in some of the simulations. The pilot simulations of ACAS Xa logic using this unmodified radar data have a bias in favor of ACAS Xa, because reactions to TCAS RAs will sometimes remove the need for ACAS Xa to issue any RA. (It is very rare to have the converse; that is, where reactions to TCAS RAs lead to simulations where no TCAS RAs are issued, but ACAS Xa RAs are issued.) Simulations with European radar data estimating the impact of this bias on the rate of RA generation, suggest that the bias is less than the expected benefit from ACAS Xa. Likewise, synthetic European operational encounters (that do not suffer from CAS bias) come to the same conclusion that there is a reduction in RA rate from ACAS Xa.
- The PASS analysis results are consistent with RADAR data. Analysis results demonstrate the SESAR Priority 1 metrics are favorable for ACAS Xa. The Priority 2 metrics are not so straightforward, the reversals and crossings metrics are unfavorable for ACAS Xa. Additionally, ACAS Xa more commonly results in large vertical deviations (>300ft) and although rare, ACAS Xa results in more "jump" scenarios – which is not considered a desirable result.

Mr. Dean then provided preliminary conclusions as follows:

- Global safety results of the new studies are mostly achieving statistical significance with AVAL, and SA01 having positive results. The Equipped-Equipped (EE) CRÈME-S needs reassessment; previous results were good for Xa. However, at end of November Egis found significant difference (worse performance) with their Equipped-Unequipped (EU) CRÈME-S encounters compared to those of FAA Program Office/MIT LL. This issue found only 10 days prior to this briefing and as yet the cause of the difference has not been identified. Additionally, Mr. Dean commented, there is also an issue with importance sampling found yesterday, which needs assessing.
- Several there are some issues that need operational validation or experience. First, fewer ACAS Xa alerts in very close encounters needs to be monitored for operational implications. Second, the

operational reaction should be monitored for vertical chase encounters where reversals through a level can occur when aircraft are separated by > 400ft. Training on this should also be developed. Third, operational impact of deviations by ACAS Xa should be monitored in normal geometries and 1000ft "jump" geometries. Finally, the operational impact of "rare RAs" should be monitored.

- There is regular technical communication between the US and Europe. Mr. Dean noted U.S. analysis of CRÈME has been insightful and U.S. simulation results have filled some European analysis gaps.

Finally, Mr. Dean noted:

- ACAS Xa is validated enough to allow ICAO SARPS changes to progress. The broad concept of ACAS Xa is agreed to be good one, even if modifications prove to be needed.
- The final report on ACAS Xa validation is still in draft; the results will be presented to SC-147/WG-75. We expect the report will include recommendations on monitoring, training and active analysis of CPs.
  At this time, the CRÈME-S encounter analysis is still open, especially for EU encounters; these observations and conclusions will be presented and discussed with EASA (ANSPs and other stakeholders) before finalization.

Item 10. Rulemaking status update from FAA and EASA certification offices

10 a. Proposed DO-385/ED-256 Change Proposal

Mr. Searight introduced this topic by stating the FAA Program Office has looked into a concern with ACAS Xa performance at low altitudes with high vertical rates under certain conditions. The team would like to present the analysis and if there is consensus that the performance should be addressed and the proposed approach seems appropriate, the changes will be formalized as a Change Proposal and placed in the Committee's repository of (ACAS Xa) Change Proposals; this would be the first written against DO-385. Pending the committee's approval on these issues, these changes will also be cited in the forthcoming TSO C-219 for ACAS Xa/Xo systems.

Mr. Micheal Owen began briefing the technical justification and performance metrics for the DO-385 Change Proposal (#001). Mr. Owen began by indicating that in aggregate ACAS Xa outperforms TCAS

The ACAS Xa team has identified and is proposing a change that is partly driven by a Crème finding. Evaluation of EE Low-altitude CRÈME encounters showed equivalent safety for TCAS and Xa. Even in altitude bins, ACAS Xa outperforms TCAS. However, the team identified ACAS Xa degradation compared to TCAS, in a very specific set of low-altitude high-climb-rate encounters. Mr. Owen reminded the Committee that ACAS Xa provides significant safety benefit for low to moderate vertical rates. However, changes have been prototyped specifically to address the ACAS Xa degradation at low-altitudes and high-vertical rates. Mr. Owen proceeded by walking the Committee through an illustrative encounter and

Reviewed specific metrics matrix results to demonstrate the improvement in performance without affecting the related encounter areas. Then he walked through the altitude vs vertical rate "heat maps" that depict probability of NMAC under the simulated conditions. After comparing TCAS performance with ACAS Xa with ADS-B and then with ACAS Xa with

ADS-B across the relevant encounter sets. Mr. Owen then explained the observations from performance analysis of the relevant encounter sets. He noted: specific ACAS Xa sensitivities are (now) observable in existing encounter sets where the effects had been masked due to relatively coarse altitude bins (which maintain statistical significance) and high climb rate frequency. Sub-dividing relevant encounter sets further can highlight discrepancies; the heatmap chart are annotated indicating encounter sets where these performance differences can be observed. A more in depth analysis of the drivers of this performance identified four areas to be addressed by a Change Proposal to the Threat Reduction Module (TRM) of DO-385.

Change 1: Force Alert Cost (slide 9)
Change 2: Low-altitude Parallel RA Deferral (slide 10)
Change 3: Offline Table Change (slide 11)
Change 4: New Online Cost (slide 12)

Once presenting the proposed set of changes to the TRM functionality, Mr. Owen presented heatmaps of the system performance with the changes implemented (slide 14). These changes result in notable improvement (reduction of NMACs) in the relevant encounters with no notable degradation in performance. Mr. Owen summarized: these Proposed changes provide significant benefit to narrowly scoped metrics on realistic encounter sets. Implementing the changes would require the publication/distribution of: ADD algorithm changes, New Cost Tables, and a new Parameter file.

Mr. Searight continued indicating the Program Office would like approval of these changes so they may be incorporated into the appendix of the TSO. – If approved today, this could be submitted as a comment to the TSO. He continued: using the TSO comment provides “audit trail”/justification for Cert and Ms. Mariano to include this as part of the upcoming TSO Publication. While, we will have time to further review correctness and completeness of this Change Proposal as the TSO is being finalized with the comment resolution. By issuing/publishing this change with the TSO, we are balancing the need to make the best ACAS Xa system we can with the need to vet, validate and approve all Proposed Changes.

Brandao: I agree to adopt the CP; I would like the group to be able to review the actual CP prior to the TSO publication – the TSO (expected release/publication 12/31/2019) will reference a TCAS PO mailbox in order to receive a copy of any pdif table, cost table(s) and other CP related information prior to publication of DO-385 Change 2)

Mr. Kevin Hallworth indicated that he would prefer to hold off on publication of the ETSO until such time as the European comments are incorporated and a resulting DO-385 Change 2 goes through its change/approval/publication cycle. Thus, EUROCAE would publish the material affect of this Change Proposal with the corresponding change/version of ED-256.

Mr. Searight responded that the leadership would like the committee to accept the Change Proposal today so we can allow formal processing of Change Proposal, and the change can be incorporated in the TSO; this will allow the TSO be issued in the timeframe that was agreed upon for FAA deliverables.

Mr. Neal Suchy reiterated that if everyone is comfortable with this change, we can incorporate it now, or we can slow-roll this change and hold it for DO-385 Change 2.

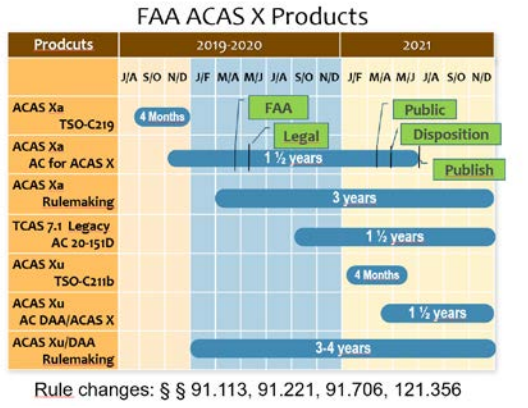
Mr. Leeper suggested that we schedule a TWG call during the week of December 9-13 to further discuss the Change Proposal and continue to target publication of TSO C-219 on/about 31 December 2019.

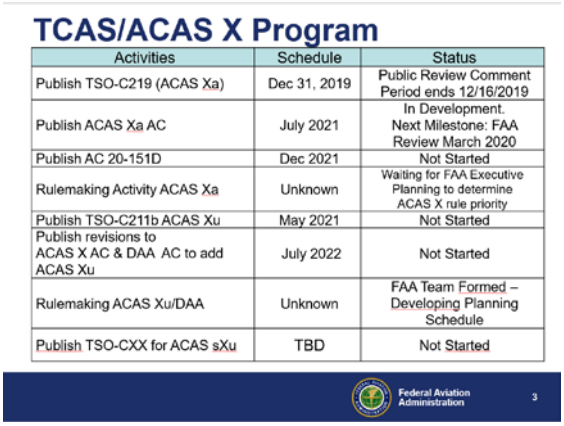
Mr. Ruy Brandao stated: We can approve in principal and retain the right to review the detailed copy of the resulting changes and have an opportunity to discuss this again. If we determine there are problems or that we require more analysis, then the Working Group can defer publication to a later date.

There was consensus to approve this Change Proposal in principal, with the understanding that SC-147 should move forward with incorporating the Change Proposal documentation/description in TSO C-219 with the option to hold/delay publication of the results for a later date if the (to-be-scheduled) WG meeting indicates the desire for a slow roll.

10 b. Update from FAA Cert/EASA on TSO/ETSO and Rulemaking status for AC-219

Ms. Sheila Mariano presented the TAA/EASA status briefing. She began by summarizing the FAA products required for the new ACAS X systems and presenting the typical timeline for these documents and related products. She translated this to a schedule for publishing the key ACAS Xa and Xu products.





Mr. Hallworth provided information on the activities identified for EASA/European commission. He indicated that rule and rulemaking references to ACAS II rev 7.1 will be updated to ACAS X. He indicated that he planned to/would try to genericize/future-proof the reference by not indicating a specific system/version in order to allow for updates/changes as they are formally released. Mr. Hallworth indicated: Based on the Change Proposal discussed today, I would like to hold onto the NPA and ETSO until DO-385 Change 2 is released.

Mr. Ruy Brandao interjected: “If I understand the timeline, an aircraft equipped with ACAS Xa will not be permitted in European airspace until at least 2022.” Mr. Hallworth indicated Mr. Brandao was correct in his understanding.

Ms. Mariano indicated that in interest of time she would like to defer detailed discussion of ACAS Xu TSO plans at a meeting to be scheduled at a later date. She indicated that those who are interested can refer to DAA equipment classification information included in back of briefing to get some additional background.

Item 11. (walk-on)Approve words to TORs.

Mr. Searight discussed the need to seek the committee’s approval to formally all ACAS sXu MOPS to our work plan. It was originally planned to have a thorough review and discussion about specific wording proposed to define the sXu MOPS, the working relationship between SC-147 and SC-228 on this effort, and propose a completion date. Given that the Plenary session had already run past the scheduled adjournment time and that an e-Plenary was now scheduled for January 21, Mr. Searight decuded to postpone a formal discussion on the proposed TOR revisions until the January Plenary, noting that there will still be sufficient time to deliver them to the PMC for consideration at their March meeting if the committee agrees to them in January. Mr. Searight did provide a quick overview of the proposed language in the revised TORs, confirmed that the proposed completion date of June 2022 met the Program Office’s needs, and asked the membership to review the entire TORs prior to the January Plenary.

Item 12. Action Items Summary

- There are some concerns and a potential change to Geometric Altitude. SWG will complete some research and Mr. Matt Haskins will brief the Combined Surveillance Committee on these concerns.
- Ms. Donna Froehlich to schedule a TWG WebEx/call during the week of December 9th, to further discuss the Change Proposal discussed in Item 10.
- Ms. Sheila Mariano to schedule meeting(s) for next week for ACAS Xa TSO plans
    - Ms. Sheila Mariano to coordinate with stakeholders/commenters on updates to the draft TSO C-21.
    - TCAS/ACAS X Program office to provide necessary information for implementing Change Proposal DO-385-001 as an appendix.
- Ms. Donna Froehlich to schedule Virtual Plenary mid-January (21st) for
    - Approval of Interoperability MASPS for FRAC/OC
    - Approve submission to PMC of (draft) TORs – presented to SC-147 today, 5 Dec
- Ms. Sheila Mariano to prepare a detailed discussion of ACAS Xu TSO plans at a later date.

Item 13. Adjourn Plenary

Mr. Stacey Rowlan moved to adjourn the Plenary; Mr. Walter Bender seconded the motion. The Motion was approved by committee; SC-147/WG-75 was adjourned approximately 13:00 local time.

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