

Special Committee 147**MINIMUM OPERATIONAL PERFORMANCE STANDARDS FOR TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEMS AIRBORNE EQUIPMENT**

The 80th meeting of the SC-147 was held on January 15th at the RTCA headquarters in Washington, DC. In accordance with the Federal Advisory Committee Act, Mr. Steve Plummer, Federal Aviation Administration (FAA) was the Designated Federal Representative for this meeting.

J. Stuart Searight	Co-Chairman, Federal Aviation Administration
Tom Troast	Secretary, Regulus Group
Hal Moses	RTCA

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.a-1.c – Opening Business

Stuart Searight opened the 80th meeting of the SC-147 which was also the 37th meeting of WG-75. Stu then acknowledged the regrettable circumstances that lead to the cancellation of the meetings which were planned to take place in Brussels in December 2014, and apologized for the inconveniences it had caused some SC-147 and WG-75 members. Stuart stressed it was not an easy decision to make, but was made together with the leadership of WG75 and that steps have been taken so as to avoid any similar situations in the future.

Stu noted that Bob Buley had retired as co-chair from SC-147 and acknowledged the many contributions Bob had made to the committee over the years. Stuart mentioned some of the reasons for Bob's retirement, noted some concern's Bob had with the ability to ensure consensus and document our process with such a highly technical system as the ACAS X logic, and promised that the process followed by SC-147 and the final ACAS X deliverables will be done in a manner that would make Bob proud. Stu then announced that Dan Tillotson, from Rockwell Collins/ARINC has been proposed to RTCA management to be the new co-chair of SC-147. Stuart expressed his happiness and relief to be able to find someone of Dan's experience with SC-147 and operational background and was confident he will be approved at the next RTCA PMC meeting in March.

Hal Moses also acknowledged Bob Buley's contributions to the committee and then discussed the history of the RTCA and its consensus-focused mission as an organization. Steve Plummer, the Designated Federal Officer (DFO), read a Public Meeting Announcement for the Plenary. Hal Moses then read the RTCA Proprietary References Policy and noted that the introduction of proprietary references into RTCA documents can be difficult so, as such, it is necessary for the committees to be aware of the process.

The committee accepted the minutes from the previous plenary in September 2014.

Agenda Item 2 – WG-75 Activities Update (*WG-75 report Jan 2015.pptx*)

Ken Carpenter presented a briefing on WG-75 activities. Ken’s briefing can be found on the RTCA Workspace in the SC-147 area under the “Presentations” folder for Plenary #80. The filename of the briefing is “WG-75 report Jan 2015”.

Ken noted that aircraft rates in excess of 5000 fpm are routine in the European airspace. Wes asked whether aircraft vertical rates could be separated into the categories of (a) safety, and (b) the effect on ATC clearance level. Thierry Arino said that it would be best to avoid RAs which aren’t needed for safety. Ken explained that the more significant operational issue is whether to cross altitudes during an encounter – high vertical rate crossing RAs can be classified as good or bad. Michael Owen asked if Ken would be able to clarify the distinction between good and bad encounters, and Ken drew a diagram with his arms. ACAS X may be able to fix the operational problem by not alerting in cases where alerting would be undesirable. Jessica Holland noted that she had UK NATS data that could be used to help analyze and resolve the problem.

Agenda Item 3 – EUROCONTROL Activities (*ECTL SC147 January 2015.pptx*)

Stan Drozdowski presented a briefing on EUROCONTROL activities. There was some discussion on the rate of unjustified RA caused by the hybrid surveillance anomaly described on slide 6 of Stan’s briefing. Wes Olson said that he had not seen instances of that in the U.S. NAS data. Stan responded by saying that he believed that the problem may be limited to one manufacturer.

Agenda Item 4 – Update on SESAR ACAS X Activities (*European contribution to ACAS Xa validation_RTCA-SC147_January2015_Plenary_v1.1.ppt*)

Christian Aveneau presented a briefing on SESAR ACAS X work.

Andy Zeitlin noted that TCAS II is based on thresholds and heuristic rules; when surveillance data is slightly different for the same encounter then the results for that encounter will be different. Ken noted that the timing of the ACAS X aircraft’s alerts can impact the logic of the TCAS aircraft due to the timing of the alerts and the responses of the ACAS X aircraft.

Wes Olson explained that there is a difference between the results being presented by Christian and the results that have been seen by the TCAS Program Office. Wes suggested that some investigation take place in order to better understand the differences in the results.

In response to a discussion about the effects of surveillance noise on the results, Christian explained that future analyses will account for the effects of surveillance noise. Those results will be briefed to the SWG, most likely at the next Plenary.

Agenda Item 5 – TCAS Program Office Overview (*RTCA - AJM-233 Status Brief 01-14-15.ppt*)

Neal Suchy presented a briefing which gave an overview of FAA TCAS Program Office activities.

Steve Plummer noted that he was mostly in agreement with what Neal presented regarding the Software Delivery Plan (SDP) but would need more time to consider whether he concurred. In regard to the slides

about logic table compression, Josh Silbermann noted that memory results will be presented at a TWG meeting in the near future.

Garfield asked about the impacts on performance inherent in the “data origami”. Neal explained that while there are differences in the different versions of data origami used, the technique does not have an adverse impact on safety.

Ken asked whether the results of the 2014 Xu flight tests would be presented to WG-73 soon. Neal said that there would be a representative, possibly Brandon Suarez, sent to brief out the results to WG-73.

Agenda Item 6 – Update of CAS Interoperability Requirements and SC-228 Interactions (SC-147_Plenary_ISRA_ProgressUpdate_Jan2015.pdf)

Adam Panken provided an overview of CAS Interoperability Requirements and the work between SC-147 and SC-228. In response to a question from Stu, Adam explained that the final version of the Phase I response document should be complete in the summer, after which the group will begin the Phase II work. Wes Olson asked whether the Phase I document will need to go through FRAC, and Stu replied that he would defer a decision on whether to put the Phase I document through FRAC until a later time.

Ken Carpenter noted that WG-73 was developing a collision avoidance OSED for DAA; Ken is working to help include material from the Phase I response document into the WG-73 document.

Agenda Item 8 – Report from WG-1 (SWG) (SWG Report out - plenary 80 final.pptx)

Mike Castle and Ruy Brandao presented a briefing of recent SWG proceedings.

Neal Suchy noted that there may need to be a change document issued against the changes needed for DO-300A. Don Walker said that if changes are needed, they can probably be appended to the associated TSO, but Steve Plummer cautioned that it may require changes to the tests as well as the TSO. Ruy said that it will be important to decide what needs to be changed before April.

Wes explained that with TRAMS/TOPA, data privacy is a significant concern. With regard to any RA data that is broadcast using ADS-B, it is possible that a third party could record and analyze the RA data. While it is not possible to do so now with Mode S transmissions, it could be easier to monitor RA data by monitoring ADS-B transmissions. Jessica Holland added that validity of transmitted data will be important in the future – currently there are many fields in the downlinked data which regularly contain inaccuracies.

Agenda Item 7.a – Report from WG-2 (TWG) (2015.01.15.TWG.Plenary.Brief.pptx)

Josh Silbermann and Stacey Rowlan presented an overview of recent TWG proceedings.

In response to a question from Ruy concerning altitude thresholds that limit the generation of inappropriate RAs, Jessica explained that the Limited Implementation Program (LIP) in the late 1980’s was a program where pilots were able to provide feedback on the performance on a set of TCAS II units which were installed on a limited number of commercial aircraft. One result of the LIP program was a set of recommendations for improvements to TCAS II, one of which was the use of the altitude thresholds which are used in TCAS II.

In regard to the discussion on the use of the green arc (on the TCAS II Vertical Speed Indicator), Wes noted that there will be no changes to the green arc use for ACAS X Run 14. Jessica added that there will be video recorded from the flight deck during the flight tests, and that video can be used to inform the discussion on the green arcs.

Regarding non-altitude-reporting (NAR) aircraft, Stacey noted that TCAS II ignores NAR aircraft above 15,500 feet; however, Mode S aircraft could be up that high & have their altitude turned off. Stacey said that ACAS X should have a way to handle those cases. Ruy cautioned that there may be a number of NAR aircraft which are much lower in altitude and not worth reporting – in such cases, the display of NAR aircraft could lead to an excess of targets displayed on the TCAS traffic display, most of which are from the ground. Stacey said that he didn't expect that there would be a high number of Mode S NAR aircraft. It may be worth it to examine data prior to making the decision to display Mode S NAR targets.

Agenda Item 7.b – Report from WG-2 (Safety Subgroup) (*ACAS Xa Safety Status 13 Jan 2015.pptx*)

Andy Zeitlin and Todd Kilbourne presented a briefing with the status of the Safety Subgroup. Charles Leeper made the suggestion to merge material from the HAZOP coordination group with the work that Andy and Todd were doing. Neal agreed and recommended using the tracking IDs from the HAZOP tracking spreadsheet for reference purposes.

Agenda Item 11.a – Next Meeting Times and Locations

The committee decided upon the following dates and locations for upcoming SC-147 in-person meetings:

April 14th-16th, 2015 – There will be 3 days of working group meetings – some joint and some separate – held at the RTCA headquarters in Washington, DC.

July 14th-16th, 2015 – Meeting location TBD, potentially at MIT in Boston

Week of September 21st, 2015 – Possible 4-day meeting, location TBD (tentatively planned for Europe)

December 8th-10th, 2015 – US Location TBD

Certified as a true and accurate summary of the meeting.

Co-Chairman

-S-

Mr. Stuart Searight

FAA

Attachment 1
Meeting Attendance for SC-147 Plenary on January 15th, 2015

Name	Organization	Email
Anderson, Craig	The Boeing Company	craig.a.anderson7@boeing.com
Arino, Thierry	Egis Avia	thierry.arino@egis.fr
Aveneau, Christian	DSNA	aveneau@cena.fr
Bender, Walter	The Johns Hopkins University	walter.r.bender@jhuapl.edu
Bess, Peter	Air Line Pilots Association	peter.bess@alpa.org
Brandao, Ruy	Honeywell International, Inc.	ruyjr.brandao@HONEYWELL.COM
Campbell, Paul	Federal Aviation Administration	Paul.Campbell@faa.gov
Carino, Joslin	Federal Aviation Administration	joslin.carino@faa.gov
Carpenter, Ken	QinetiQ	ken@kencarpenter.co.uk
Castle, Michael	Aurora Sciences LLC	mcastle@aurorasciences.com
Cato, Mark	Air Line Pilots Association	mark.cato@alpa.org
Chludzinski, Barbara	MIT Lincoln Laboratory	bjchludzinski@ll.mit.edu
Ciaramella, Kathryn	Federal Aviation Administration	kathryn.ciaramella@faa.gov
Clarke, Robert	Alion Science and Technology	rclarke@alionscience.com
Dean, Garfield	EUROCONTROL	garfield.dean@eurocontrol.int
Drozdowski, Stanislaw	EUROCONTROL	stanislaw.drozdowski@eurocontrol.int
Drumm, Ann	MIT Lincoln Laboratory	drumm@ll.mit.edu
Froehlich, Donna	Aurora Sciences LLC	dfroehlich@aurorasciences.com
Gallo, Wayne	Federal Aviation Administration	wayne.gallo@faa.gov
Godoy, Jose	ARINC Incorporated	jgodoy@sae-itc.org
Gonzalez, Jose	Federal Aviation Administration	jose.gonzalez@faa.gov
Graner, Yvonne	DFS Deutsche Flugsicherung GmbH	yvonne.graner@dfs.de
Hogestad, Marie	Federal Aviation Administration	marie.hogestad@faa.gov
Holland, Jessica	MIT Lincoln Laboratory	jessica.holland@ll.mit.edu
Jeziarski, Carl	Federal Aviation Administration	Carl.Jeziarski@faa.gov
Kilbourne, Todd	Systems Enginuity, Inc.	tkilbourne@systems-enginuity.com
Klang, Pavel	Honeywell International, Inc.	pavel.klang@honeywell.com
Klyestova, Anna	Airbus	anna.klyestova@airbus.com
Kobzik-Juul, Barbara	The Johns Hopkins University	barbara.kobzik-juul@jhuapl.edu
Law, John	JL SURACAS Ltd.	johnsimonlaw@icloud.com
Le Clezio, Fabrice	Thales Group	fabrice.leclezio@fr.thalesgroup.com
Leeper, Charles	The Johns Hopkins University	charles.leeper@jhuapl.edu
Lester, Ted	The MITRE Corporation	elester@mitre.org
Moses, Harold	RTCA, Inc.	hmoses@rtca.org
Pagano, Thomas	Regulus Group	thomas.ctr.pagano@faa.gov
Panken, Adam	MIT Lincoln Laboratory	adam.panken@ll.mit.edu
Parthasarathy, Bharath	Garmin Ltd.	bharath@garmin.com
Pennington, Darrell	Air Line Pilots Association	darrell.pennington@alpa.org
Petri, Michael	Federal Aviation Administration	michael.petri@FAA.GOV

Rowlan, Stacey	L-3 Communications	stacey.rowlan@l-3com.com
Saunders, Jonathan	Aurora Sciences LLC	jsaunders@aurorasciences.com
Searight, Stuart	Federal Aviation Administration	stuart.searight@faa.gov
Sheth, Nishit	Subsystem Technologies Inc.	nishit.ctr.sheth@faa.gov
Sigman, Alan	Federal Aviation Administration	alan.sigman@faa.gov
Silbermann, Josh	The Johns Hopkins University	joshua.silbermann@jhupl.edu
Suarez, Brandon	General Atomics Aeronautical Systems, Inc.	brandon.suarez@uav.com
Suchy, Neal	Federal Aviation Administration	neal.suchy@faa.gov
Tillotson, Dan	ARINC Incorporated	dtillots@arinc.com
Toussaint, Stefan	CTSI	NOMATCH
Troast, Thomas	Regulus Group	tetroast@regulus-group.com
Utley, Robert	National Air Traffic Controllers Association	rutley@natcad.org
Walker, Don	Federal Aviation Administration	don.walker@FAA.GOV
Witt, Samantha	Regulus Group	samantha.ctr.witt@faa.gov
Zeitlin, Andy	The MITRE Corporation	zeitlin@mitre.org