

Special Committee 147

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

The 86th meeting of the SC-147 was held on December 7th, 2017 at Johns Hopkins University Applied Physics Lab (JHU APL) in Laurel, MD. In accordance with the Federal Advisory Committee Act, Ms. Sheila Mariano Federal Aviation Administration (FAA) was the Designated Federal Officer (DFO) for this meeting.

J. Stuart Searight	Co-Chairman, Federal Aviation Administration
Ruy Brandao	Co-Chairman, Honeywell
Donna Froehlich	Secretary, Aurora Innovations
Rebecca Morrison	(for Al Secen) 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.d – Opening Plenary Session

Stuart Searight opened the meeting and thanked Josh Silbermann of JHU APL for arranging the host-site. Then Mr. Searight deferred to Ms. Rebecca Morrison; Ms. Morrison read through the [Public Meeting Announcement and reviewed the Proprietary information policy and the Committee Participation policy](#) for the Committee.

Ms. Mariano and Mr. Searight asked the committee if they approved of the minutes from Plenary Meeting #82. There were no comments or objections; the minutes were approved.

Next, Sheila Mariano, the Designated Federal Official (DFO), read the [public meeting announcement](#).

Future meetings are already scheduled, review of those dates were deferred until closing.

Agenda Item 2. – Report from WG-75 (30 min / 915) – Booth

As this Plenary was a joint meeting with EUROCAE WG-75, Mr. Bill Booth opened that working group meeting. Mr. Booth provided highlights on current and future activities of WG-75 (http://workspace.rtca.org/apps/org/workgroup/sc-147_tcas/download.php/30936/WG-75%20SC-147%20MD%207%20December%202017.pptx).

- Mr. Booth indicated that WG-75 had initiated Open consultation for ACAS Xa/Xo MOPS (pre)FRAC,

- WG-75 contributions to the Xu effort was another of the topics presented. This included ISRA Response development into interoperability MASPS. Coordinating with CSG to get some items on calendar for discussion. Mr. Panken indicated next few meetings already have topics for the agenda, but we can get to that without interfering with pre-FRAC/FRAC activities

Then Mr. Booth itemized some significant recent WG-75 activities/discussions. These included:

- WG-75 joint meeting with SESAR JU / EASA
- Run15R2(A) “from Scratch” development advocated
- There is EU/EC/EASA drive for performance based Standards
- ACAS X Operation in European Airspace (EASA slide (#9))

Mr. Booth also presented a timeline that assumed MOPS sign-off in /Fall 2018. Mr. Booth also highlighted the ways forward on a European Safety Study for ACAS X in order to meet the EASA requirement for ACAS Xa acceptability. Mr. Booth then indicated more detailed plan/timeline to perform Verification on the final FRAC version would be outlined in January when the Executable from the ADD and parameter & threat tables are in place and the Test Suite is ready and available.

Agenda Item 3 - Updates on TSO schedule, Cert Plan and Final Product – Mariano

Ms. Mariano indicated that TSO schedule is still in line with current schedule. She indicated that there has been an exchange of ideas with the vendors related to the approach of categorizing the ACAS X products for TSO and Certification and more work will be done on this over the next several months.

Agenda Item 4 a – SWG Working Group Report – Brandao/Bender

SWG meetings this week were dedicated to working on addressing pre-FRAC comments in order to ensure they are addressed in a timely manner; no additional Status/Brief-out from SWG.

Agenda Item 4 b – TWG Working Group Report – Silbermann/Rowlan

Mr. Silbermann presented slides highlighting our pre-FRAC resolution plan, with next steps leading to the March Face-to-Face meetings. At the March Plenary we plan to highlight MOPS and the ADD comments and the changes that drove them.

Mr. Brandao introduced question about ADD changes affecting Test Suite. Mr. Booth requested that Mr. Silbermann let him know of any delays to the ASIM and test suite release.

Mr. Silbermann indicated comments are still being accepted; if we cannot address them during pre-FRAC, they will roll into the FRAC process. Mr. Petri reiterated that goal of FRAC is to review the FINAL copy; our intention is to address all comments received in time for the FRAC release of MOPS documents

Mr. Silbermann also noted that the next TWG is Jan 10 at 10am EST.

Agenda Item 5 – Pre-FRAC Comments

In the interest of time and timing, resuming work on the pre-FRAC comments as a combined working group was deferred until closing of the Plenary and was resumed after a break for lunch.

Agenda Item 6– Closing

There was some discussion about upcoming meetings. The upcoming SC-147 face-to-face meetings will be as follows:

Year	Dates	City	Venue	Host Organization	Focus
2018	March 6-8	Washington, DC	RTCA Headquarters	RTCA	ACAS Xa/Xo *
2018	May 15-18	Washington, DC	RTCA Headquarters	RTCA	ACAS Xa/Xo *
2018	July 24-26	Washington, DC	RTCA Headquarters	RTCA	ACAS Xu
2018	April 17-19	Washington, DC	RTCA Headquarters	RTCA	ACAS Xu

*March and May meetings will include Plenary

Stuart Searight adjourned the SC-147 plenary. Bill Booth closed the meeting for WG-75. A working meeting reconvened after lunch to address pre-FRAC comments and to identify a resolution, or resolution plan.

Certified as a true and accurate summary of the meeting.

Co-Chairman

Co-Chairman

-S-

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Mr. Stuart Searight

Mr. Ruy Brandao

FAA

Honeywell

Attachment 1
Meeting Attendance for SC-147 December 7th, 2017

Name	Organization
Alvarez, Luis	MIT Lincoln Laboratory
Arino, Thierry	Egis Avia
Aveneau, Christian	DSNA (EUROCAE Member)
Bender, Walter	The Johns Hopkins University
Bess, Peter	Air Line Pilots Association (ALPA)
Booth, Bill	EUROCONTROL
Brandao, Ruy	Honeywell International, Inc.
Bromberg, Emily	The MITRE Corporation
Carino, Joslin	Federal Aviation Administration (FAA)
Carpenter, Ken	QinetiQ (EUROCAE member)
Ciaramella, Kathryn	Federal Aviation Administration (FAA)
Cowen, Emilie	MIT Lincoln Laboratory
Drozdzowski, Stanislaw	EUROCONTROL
Drumm, Ann	MIT Lincoln Laboratory
Field, Jack	The MITRE Corporation
Froehlich, Donna	Aurora Innovations
Gardner, Ryan	The Johns Hopkins University
Graner, Yvonne	DFS GmbH (EUROCAE member)
Hahn, Edward	Air Line Pilots Association (ALPA)
Hallworth, Kevin	European Aviation Safety Agency (EASA)
Jessen, Ian	MIT Lincoln Laboratory
Joseph, Mischael	Federal Aviation Administration (FAA)
Klang, Pavel	Honeywell International, Inc.
Klaus, Robert	MIT Lincoln Laboratory
Kobzik-Juul, Barbara	The Johns Hopkins University
Law, John	Federal Aviation Administration (FAA)
Leeper, Charles	The Johns Hopkins University
Lorenzo, Edwin	The Johns Hopkins University
Mari, Charlene	Egis Avia
Mariano, Sheila	Federal Aviation Administration (FAA)
McLain, Cynthia	MIT Lincoln Laboratory
Monk, Walter	CSSI, Inc.
Morrison, Rebecca	RTCA
Olson, Wesley	MIT Lincoln Laboratory
Panken, Adam	MIT Lincoln Laboratory
Petri, Michael	Federal Aviation Administration (FAA)
Robin, Jean-Luc	Airbus
Rowlan, Stacey	L-3 Communications
Sanderson, Brian	The MITRE Corporation
Saunders, Jonathan	Aurora Innovations
Searight, Stuart	Federal Aviation Administration (FAA)
Shafaat, Taji	The Boeing Company
Sigman, Alan	Federal Aviation Administration (FAA)

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Name	Organization
Silbermann, Josh	The Johns Hopkins University
Teller, Tom	MIT Lincoln Laboratory
Unruh, Dwight	Rockwell Collins, Inc.
Vargo, Erik	MITRE
Wilson, Kevin	Honeywell International, Inc.
Zeitlin, Andy	The MITRE Corporation

Attachment 2
Post-Plenary Working Session Notes

The SWG and TWG agreed to work jointly on the Critical and High Comments from the Pre-FRAC. These working session notes are representative of the prioritization of the pre-FRAC comments and the collaborative approach that the WG leads are using for pre-FRAC comment resolution.

- Regarding Table 2-39; Mr. Brandao request to Mr. Saunders (for RMJM): for every output it would be good to have the intent of the data (output). – **Agreed, assuming time available, may have to be prioritized**
- Line 7757 remove “s/w bug” in last cell. Agreed, assuming vendors want this table in the MOPS, want to know the value. **ACTION: Mr. Silbermann asked vendors and other stakeholders whether these (displays, controls outputs) tables are useful to anyone.** (This is also related to his “low” comment in these tables)
- Comment 28987, line ...Intruder Bearing Row Remove “shall (1789)” and change to “must” in this comment of this table. **Mr. Rowlan: Other display requirements cover this. AGREED – No action required.**
- Comment 28999, line 8560, **Xo, Mr. Saunders/Mr. Petri: Another comment fixed this. ACCEPTED/Complete**
- Comment 29024, line 11218, **Ms. Drumm will update the definitions section and that will resolve discrepancy on DF=20 bits for RA Report.**
Ms. Drumm: raised comment on timing of occurrence for developing test. **Silbermann: I am going to do that and stay on top of that so we don’t delay vendors. I will reach out to you (Ms. Drumm) and Mr. Rowlan shortly.**
Additional discussion with Kevin Wilson and Ann Drumm; this closed > 6 comments regarding message fields/bits; these will also be handled with the update of the MOPS definitions.
- Line 11392, Scenario C and another, **Mr. Silbermann will run the test(s) and coordinate with Mr. Klaus to if there are difficulties.**
- Comment 29039, line 11784 Scenario A; **Ms. Drumm: I want to make a change here, I’ll take care of the comment at the same time.**
- Line 11943 and line 11950 (and next 2) need algorithm name and line number. **CSG to provide Mr. Sigman with correct info)**
- Question whether we should number SHALLs in Section 3 (Equipment installation) and/or whether the wording is a SHALL requirement. Mr. Wilson gave an example: Section 3.2.2 line 16887. Mr. Bender: this is likely from DO-185B. Saunders: there is a similar comment regarding SHALLs in test section. Mr. Silbermann indicated: **Unique numbers for the SHALLs in both Sections (and sub-sections) will be generated/incorporated. ACTION ITEM to editor (Mr. Sigman)**

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- Comment 29106 line 8227, Xo Mr. Klang asked a question on “Unavailable to Run”. .. **Mr. Saunders indicated that explanation gave made sense, Mr. Klang’s text will be incorporated**
- 29109 line 8303, Mr. Klang provided clarification. Mr. Saunders: agreed to fix based on additional contributions from Mr. Petri. Mr. Zeitlin then pointed out the SHALL (requirement) immediately below. **Mr. Saunders: agreed that Xo will look at 8302-8315 and resolve.**
- Comment 29123, line 6534, **Mr. Brandao agreed to review the MOPS wording and comment with input from Mr. Jessen**
- Comment 29128, addressed in discussion of other comments/areas yesterday, **Assigned Xo SubGroup to change SHALL allowing vendors to implement work-around. Mr. Silbermann and Mr. Saunders to discuss whether we need ADD to be consistent (whether we need an ADD comment for this also.)**
- Line 11051-11055: **Mr. Brandao agreed to recommend adjusted wording; they do have to meet performance requirements regardless of the algorithms used (suggestive or required)**
- **The overview comment(s) will be addressed in Section 1 rewrite; Mr. Sigman to coordinate the comments/inputs.**
- Comment 29444, line 16857 Table 2-91 **SWG agreed to coordinate with the Transponder MOPS POCs**
- Line 17552-17558 .. shall in a note, **Assign to Sigman (change shall to must?)**
Additional discussion: Leeper comment on “targets in excess of 30 will be deleted in order of decreasing range” Brandao: this is front-end and doesn’t refer to STM. Leeper:... Petri: This is a note that appears to be a reminder of a SHALL requirement that appears earlier. Brandao: This is in the test section, it appears to be written to explain what is going on. Bender: OK, if anyone wants further changes in this “paragraph” then they should submit and additional comment. **Agreed to defer resolution of additional discussion items (these were not part of the original comment).**
- 29614 line 3628 Do you mean to give a requirement number for “Bits 1-49 shall be ZEROED”. Ms. Drumm: Transponder MOPS asked for this. Ms. Froehlich: Sounds like a Requirement. **Mr. Rowlan: Yes, make this a requirement, bold the SHALL and assign a requirement number.**
- Comment 29635 Line 6177, comment from Mr. Castle comment; Jessen and others discussed. Mr. Bender: ADD doesn’t function properly if ownship data is not time ordered, hence a requirement. **No action required.** Mr. Rowlan and Mr. Brandao indicated: In system integration test we have already added something to instruct vendors to inspect the data messages and make sure they are in order; **no action required.**
- Comment 29639 line 6456, comment from Mr. Castle: duplicate address question – is this possibility being considered and addressed? Mr. Brandao: This is a front-end requirement, what happens if this gets passed to STM? Mr. Jessen: from ADD standpoint, If dup address is identified by STM there will be an attempt to correlate the data – correlation would be unsuccessful; STM will maintain a track that meets the validity checks. **Mr. Bender: So the MOPS doesn’t need a change; no action.**

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- Comment # line 2602 table 2-7: Ms. Drumm: I plan to start on this, but I could use help, as I have other demands on my time. **Mr. Bender and Mr. Silbermann took Action to find resources for this update.**
- Line 12093-12113 Info on Update coordination bit. Drumm: I have written text for this, still working on it. Applies to next comment as well.
CSG Will submit in conjunction with ARA bit editorial.
- Comment 29746 line 3626 **Ms. Drumm: I will review this comment and the Transponder feedback with CSG and will pass to Stacey for review.**
- Comment 29748 line 11822 Ms. Drumm: **Assign this to CSG.**
- One Comment indicated fixes required in ADD as noted by Ms McLain. Ms. McLain indicated the **ADD changes are captured in an ADD comment; no action required.**
- Comment 28586 line 8168 Petri: Question was answered: We decided not to put ASA requirements in our MOPS), **Xo will take action to delete this editorial text from MOPS**
- Comment 28590 line 8195 Mr. Petri and Mr. Saunders agreed that this was covered by (Xo) discussion yesterday, and indicated this comment is resolved. This was accepted by the WG, **no additional action required.**
- Comment 28593, Line 8207; Comment 28594; Another comment regarding data block/data tag. **Xo to fix in conjunction with resolution of other data block display comment.**
- Comment 28602 line 8397 Ms. McLain we already raised an Issue that generated a CP, this was corrected in ADD (Run15R2A). **Xo to Address the MOPS language - 2nd sentence gets deleted.**
- 28609 discussed yesterday (confusing terminology) **Agreed to work with language discussed yesterday**
- Comment 28610. The sentence has already been deleted; **no additional action required.**
- .Line 8570 Designation status wording is confusing; **Xo subgroup to address**
- Comment 28611 line 7795 Petri asked for clarification on language (inherited from DO-185) Ms. Mariano: system needs self-test, not monitor; the pilot needs to initiate, need positive feedback that you are in self-test mode, probably can be re-worded. Mr. Olson: we inherited this language, we need to prioritize edits based on problem. **Mr. Petri will propose language and ask Ms. Mariano for review. – Manufacturers noted they were ok with this, if it doesn't get changed.**
- Comment 28636 line 6704 We already discussed target designation and **assigned to Xo for resolution.**
- Comment 28677 line 19623 Mr. Petri indicated this [appendix (H)] is ref material from Surveillance MOPS –He recommended some explanation regarding why this information is provided as a reference as there is

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no text describing why we have this. Mr. Carpenter: Suggest something like: Xa/Xo uses hybrid surveillance as in DO-300. Mr. Panken: People using this MOPS may find this information valuable. I like the concept that it is in one place. Mr. Petri: I would also like something at beginning of appendix indicating when study was done (and why it is there) **Mr. Brandao: assign to the Section 1 team.**

- Similar comment and resolution for Appendix G, variable validation intervals (also from Hybrid Surveillance MOPS) – **Assigned to the Section 1 team**
- Comment 28653 line 5844-5846 Petri: Recommends wording change ACCEPTED and assigned to Alan Sigman
- Comment 28666 line 5880 Mr. Petri: Title is STM Track Source Selection, table is there with the text (lines 5888-5890) – **Comment withdrawn**
- Comment 28667 line 5893 Mr. Petri comment. Mr. Jessen recommended “When ownship heading is degraded, traffic bearing data will be supplied...” **Recommended wording ACCEPTED**
- Comment 28681 Line 6000 label: Figures don’t have labels: Mr. Brandao: we may have updated figures. **Assigned to Brandao to make sure the figures and labels are updated.**
- Several comments from Mr. Hahn: **Address in Section 1 rewrite.**
- Line 1163 Comment from Mr. Carpenter re: definition of ASA vs that of Aircraft Surveillance Applications ASA (System) DO-317, ASAS which is the one we believe is intended; **Mr. Petri to review document and draft a resolution; Mr. Carpenter agreed.**
- Additional glossary comments/edits from Mr. Carpenter. **ACCEPTED, edits to Alan Sigman with EXCEPT the group decided to reject: “INCREASE RATE is typically 2500 fpm”**, as that level of detail is not provided in similar definitions.
- 28877 line 4847 Comment “So What ... Delete the note” Mr. Panken had wanted the note; Mr. Jessen feels it would be OK to delete since it doesn’t seem to clarify. **Agree, note will be deleted.**
- 28889 Line 8119 Xo comment from Mr. Carpenter; Xo reviewers; **AGREE; ACCEPTED edit, action for Sigman to implement.**
- 28894, line 8329 Xo comment from Mr. Carpenter: Saunders/Petri: noted: we already agreed we are not going to provide Xo Mode info in data tag. **Xo agreed to provide clarification based on resolution of previous Xo comments.**
- Comments 28900, 28906, 28907, 28908, prev comment on Lines 8345-8355, and several subsequent comments. Discussion on Figures of Examples provided. Mr. Shafaat: does this provide any valuable information to the flight crew? Also red text on black back-ground is a bad example, hard to discern and read. Mr. Petri: this is the best example we had for explaining why an RA occurred (if an aircraft was designated for no alert). Mr. Robin: we address this in training, make it as simple as possible. Mr.

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Brandao: Is this suggestive or proscriptive. Mr. Robin: this is part of the other data block/data tag discussion. Mr. Brandao: If there is a requirement that is wrong, I request you identify the SHALL; also I request you make sure that there are no SHALLS that limit your ability to implement the ACAS Xa/Xo display. That said, many of these are illustrations; the illustrative **Xo SubGroup will do a fine job addressing the comments**. Ms. McLain added: we also want to make sure sufficient info is coming out of ACAS X system so it is available for now, and the future. Mr. Brandao: We DO not have to impact the ADD if there is additional data being output by ADD, the interface section may indicate if data is being provided for manufacturer's flexibility for Display (or other system). Comment regarding Training: Pilot cannot circumvent an RA by changing the mode of the system. Mr. Carpenter agreed to read the revised sections "fresh" next time.

- 28926 Glossary comment from Mr. Carpenter. **Agree to add that info; Xo will draft**
- 28928 SWG inconsistency comment from Mr. Wilson (not more than 7% or 8%) **Mr. Panken or Mr. Pagano to investigate and determine whether the SHALL or this note has the right value.**
- 28930 line 2114 comment generated discussion about text lines 5600-5604: Discussion moved to line 2117 at end of sentence add "or the ADS-B Operational Status Message" Mr. Brandao & Mr. Rowlan: YOU have to listen to the Broadcast message if it comes in.... **get rid of "or the ADS-B Operational Status Message" in the 5600-5604.** THEN Mr. Wilson is ok with text on line 2114 **(Comment Withdrawn)**
- Line 3599 Table 2-13 **change "&"s to "+"es**
- Line 3925 Discussion: Mr. Rowlan: You don't IGNORE it. This used to be used in TCAS, we don't use it in ACAS X. Ms. Drumm: You don't want to allow the bus to fail. Mr. Wilson: **Delete SHALL, insert "The equipment does not use the Sensitivity Level Command for ACAS X functionality. The system SHALL (###) continue to accept the Sensitivity Level message" (for compatibility)** Mr. Rowlan noted: there is a test that for accepting and acknowledging the SL command.
- Line 4005 possible (edited) legacy requirement from TCAS enabling/disabling the display. – Should we **display this requirement (2200) and thus the subsection? AGREED**
- Line 4880-4883 DFO, 4, 17 want to **listen for any of the 3 messages and act on any of those 3 types received for altitude info**
- Line 7768, **Mr. Rowlan will take action to look up lowest altitude encoding allowed.** (Mr. Wilson contributed: Transponder will never transmit lower than -1000.
- 28993 line 8059 .. GNSS status: Mr. Jessen: we don't take in ground speed or .. don't need to add them to the list. – **No action.**
- Mr. Rowlan added **new comment**: regarding the item: "Monitor selected SL (standby, TA, TA/RA, 3,4,5,6,7)" can we **delete the 3,4,5,6,7. AGREED**
- 28994 Xo comment addressed by earlier Xo comment – **No further action**

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- Mr. Wilson requested a NOTE in his comment: Mr. Petri indicated the note as requested is not correct. **Comment withdrawn, no further action.**
- Line 8427 Mr. Wilson comment regarding Xo un-designation: This happens at 50ft (item 2); aircraft has other ways to determine whether it is on-ground. Mr. Jessen: This is an opportunity to use one of two existing definitions. Ms. McLain: In ADD we use the on-ground determination in STM. Rowlan: the MOPS would have to specify that the un-designation would happen when you transition from in air to on-ground. Further discussion involving next item (3). Xo to discuss further? McLain: What is being done in code is consistent with MOPS. **Mr. Wilson was satisfied with the discussion and withdrew the comment – no action.**

At this point the CRITICAL and HIGH comments were addressed. The WGs agreed to discuss a few more comments that might be of interest across multiple groups.

- Mr. Brandao raised ADD Comment 29505 for thought and subsequent discussion: ... isprox can affect which aircraft get displayed.. Airbus only displays the first 8 (or first 8 display-able intruders) Need to make sure there is no side effect. If we integrate with CDTI, if we have bearing, don't we want to display it? Mr. Jessen: When I say bearingless, I am referring to not having bearing for the track. **Mr. Brandao thanked the group and indicated that SWG would discuss further at one of the net SWG meetings.**
- Mr. Jessen wanted to discuss a few ADD comments – these were allocated to SWG for discussion and identification of resolution/approach
- Mr. Jessen wanted to discuss comment from Ms. Kobzik-Juul on sense of vertical separation display... this one is counterintuitive even though it is what TCAS does. Negative means ownship is below intruder, instead of having an ownship reference and using "+" to designate the intruder is above ownship. Mr. Brandao indicated we should: **Keep it like DO-185; we can highlight this in interface section. This was generally agreed upon.**
- An ADD Comment from Ms Kobzik-Juul requested resolution on finding out if passed parity check, normally the CVC code available for the testing. Mr. Jessen queried: Is it appropriate to have data in our interfaces that doesn't serve a functional purpose but is only used to streamline tests? ...On response: It would also have to be renamed to something like CVC_parity-check (if parity fails inside STM, Ms.Kobzik-Juul recommended "0") SWG leadership was ok either way. **ACCEPTED to add the parity check.**
- ADD comment 21966 regarding Suggested algorithm, 316 CalculatelmageRangeRate: want change to improve calculation. Agreed that **SWG will discuss and make recommendation**
- Comment 29003, line 8785 **new figure ... needs ACAS X instead of TCAS, on-ground/in-air indicator and other items may need to be added**
- 29033 Line 11525 what is desired output for the test? **Mr. Silbermann: took action to address desired output/results for the test.**

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- Comment 29038 ... **Leave as is; no action**

- Comment 29041 from Mr. Wilson: This is implementation specific and you shouldn't have that parenthetical. Mr. Rowlan: Concur. **CSG needs to be aware of this parenthetical being eliminated before they review this test.**

- 29049 line 14360 there is an editor's comment in-line about a missing section. We verified the section was added to the MOPS and the **editor's comment needs to be removed from the document.**

- 29050 regarding embedded/editor's comments on Tests 4a and 4b – **Referred to Mr. Sigman to ensure they are addressed.**

- Comment 29070 Line 6356 Recommend deleting requirement (1979) and (1980). Agree that these are NOT necessary as minimums. STM handles this situation because it won't generate a track on them. Mr. Rowlan: we also (already) have a requirement the Surveillance won't track ownership. **Agreed: delete requirements 1979 and 1980.**

- Comment 29071 line 4670 – **SWG has action to determine whether to outdent/promote this subsection**
- Comment 29072 line 6526: **Remove tcas_operational in second row of table; Agreed**

- Line 10291 Agree with proposal to add success criteria for test. **Mr. Brandao and Mr. Rowlan assigned action to discuss implementation of proposed success criteria.**

END 3:30