Summary of the 16th Meeting
Special Committee 227
Standards of Navigation Performance

The 16th Plenary Meeting of RTCA Special Committee 227 (SC-227) was held on December 2 and 4, 2015. This meeting was held at RTCA. Attendees, at meeting and via webex, included:

Dave Nakamura (Chairman SC-227)	Advanced PBN Solutions / SAIC
Barry Miller (Designated Federal Official)	Federal Aviation Administration
Sam Miller (WG3 Co-Chair)	MITRE
Richard Jinkins (WG3 Co-Chair)	Rockwell Collins,Inc.
Jennifer Iversen (Program Director)	RTCA
Mike Cramer	The MITRE Corporation
Patrick Cazaux	Thales Avionics
Mesfin Ali	Fedex Express
Jenipher Scott	U.S. Air Force
Steve Horvath	Garmin
David Jordan	Universal Avionics Systems Corp.
Gözde Ceren KÜÇÜKERDÖNMEZ	STM A.S.
Scott Lyon	L-3 Communications
Jeff Meyers	Federal Aviation Administration
Brad Miller	Federal Aviation Administration
Michelle Yeh	Federal Aviation Administration
Jeff Williams	Jeppesen
Anup Raje	Honeywell International, Inc.
Patrick Wipplinger	Lufthansa Systems
Diana Takata	Federal Aviation Administration
Hasan Haq	The Boeing Company
Alexander Engel	EUROCAE
Axel Friedrich	Navtech
Ruth Hirt	Federal Aviation Administration
David Olsen	Federal Aviation Administration
Thatch Vandenbergh (on phone)	Jeppesen
Alexandre Capodicasa (on phone)	Esterline CMC Electronics
Sophie Duschesne (on phone)	Esterline CMC Electronics
Michael Gordon Smith (on phone)	Esterline CMC Electronics
Guy Deker (on phone)	Thales Avionics

In accordance with the Federal Aviation Advisory Committee Act, Barry Miller, Federal Aviation Administration, was the Designated Federal Official for this meeting.

RTCA SC-227, Standards of Navigation

- The 16th Plenary meeting of SC-227 was convened at 9:00 a.m. EST by Chair Dave Nakamura (Advanced PBN Solutions / SAIC) and the meeting was opened officially by the FAA DFO Barry Miller.

- Each person in attendance was invited to introduce themselves.

- Dave reviewed the agenda (copied below). He noted that the purpose of this meeting was to get a common understanding of the work to be performed under the terms of reference, to set the context for the technical standard and to begin the process of identifying the issues to be worked.

Summary Agenda:
1. Welcome and Administrative Remarks
2. Introductions
3. Agenda Overview and Schedule
4. RTCA Overview Presentation
5. Background on RTCA, MOPS, and Process
6. NextGen PBN Roadmap and SC-227
7. PBN: ICAO PBN Manual, DO-236 and DO-283.
8. SC-227 Scope and Terms of Reference review
9. Overview of DO-257A
10. SC-227 Structure and Organization of Work
11. WG3 Breakout
12. RTCA workspace presentation
13. Other Business
14. Date of Next Meeting
13. Adjourn

During these initial discussions Dave pointed out that SC-227 had recently completed RTCA DO-283 MOPS for RNP equipment. The updates to the DO-257 MOPS are expected to align the functional and performance requirements for electronic map to those for the system and equipment in the MASPS and MOPS. Lastly, the update to DO-257A is expected to be completed by December, 2017.

RTCA Overview and Workspace

Jennifer Iverson, SC227's new/old program director, reviewed RTCA, its history, corporate structure, and the roles and responsibilities of RTCA, Chairs, DFO, and Secretary.

- RTCA follows FACA and under FACA all meetings are public and advertised in the Federal Register.
- The DFO must be at every meeting.
- All interested persons are permitted to attend the plenaries and must be allowed to speak.

Jennifer also provided an overview to the RTCA workspace for SC227 and Working Group.

Intellectual Property Policy

Jennifer reviewed the RTCA policy and process for development of standards and how any related or relevant intellectual property must be addressed.

Membership Policy

Jennifer reviewed the new membership policy. She stated that companies participating in RTCA committees must be members of RTCA starting January 1, 2016. Consultants to the FAA are considered to be members if they have an FAA email address, and similarly for consultants for other companies.

NextGen PBN Roadmap and SC227

Mike Cramer, who is leading the PARC Navigation Action Team, stated that the NAS PBN Strategy Ad Hoc Working Group is updating the PBN Roadmap (first issued in 2006). Planned completion is early 2016. Mike showed a draft table that illustrated the levels of operational services intended for various types of airports and airspace, the types of flight operations anticipated for the near, mid and far term, and applicable ICAO navigation specifications for aircraft and operational approval. Since this is work in progress, and being shown to the committee as a courtesy, it will not be posted to the committee workspace.

ICAO PBN Manual, DO-236 and DO-283

Dave provided information on the relationship of the DO-236 MASPS and DO-283 MOPS to both the RNP and PBN Manuals. Additionally, he provided a brief history of the MASPS and MOPS standards with regard to navigation specifications contained in the PBN manual, i.e. they are not intended to be associated with all of navigation specifications. Dave also showed the RTCA RNP documents and how they were initially managed by SC181 and how they will be managed going forward by SC227 and SC217

Considerations that were shared for the current committee effort:

- The same information may be displayed in many different forms.
- A foundational aspect of RNP is that "Total System Error" = Position Estimation Error + Path Definition Error + Path Steering Error. "Path Steering Error" includes both flight technical error and display error. The committee has established an assumption that display error is negligible

and focused on flight technical error. One question is whether there needs to be more discussion on display error.   Also, the DO-257 functional and performance requirements must align to the display error assumption.
- One of the challenges of this effort is that DO-257 must address a great range in possible systems, architecture, installations and applications. It must ensure consistency in guidance for navigational displays for PBN applications

TOR Review

Dave Nakamura reviewed the terms of reference. The task for the committee is to update RTCA DO-257A to be consistent with DO-236C and Change 1 and Revisions to DO-283A. The TOR provides the committee with the basis is to update (1) the displays of navigation information in the flight deck to support PBN and more directly to support RNP, and (2) regulatory information that is referenced in the MOPS but that is antiquated or in error.

Again, the target date for the revision is December 2017.

Based upon the early discussion, it was requested that if any industry members recognize that there may be proprietary information or ideas included in the update (e.g., patent information), please make it known as soon as possible so it can be addressed/removed.

Dave pointed out that the scope of approved work is narrow. If anyone feels that there is an out of scope issue that must be addressed, they are welcome to raise it to the committee to see if there is support for it.   And if there is support, it will have to be raised with the PMC for their review and approval of committee work. No out of scope work will be performed by the committee.

One comment made was that there are alternative presentations of navigation information on Electronic Flight Bags (EFBs) that do not go through airworthiness approval. It would be good ensure the MOPS update makes clear the divisions and dependencies with respect to the applicability of RTCA DO-257A related to these systems.

DO-257 Review and Work Program

Richard Jinkins provided a history and overview of RTCA DO-257A. The pdf version of RTCA DO-257A is on the SC-227, WG-3 workspace.

Sam Miller reviewed a proposed, initial work program for the revision:

A. Review map display and processing performance requirements (All)

1. Review RNP navigation display equipment standards and PBN operational considerations (All)
2. Display of RNP/PBN features (Sam, Mike, Dave)
3. Display of Flight Plan (All)

B. Human factors requirements for EMDs – Updates (Michelle Yeh)

C. TSO-C165a – Appendix 1 updates (Brad Miller, Jeff Meyers)

D. Review installed equipment requirements (All)

Sam Miller reviewed the format and content of a change proposal as established for SC227. He urged change proposal inputs provide as much detail as possible.

At this point, the plenary session was adjourned. The group reconvened for Working Group 3 discussions held from December 2-4.   Notes from the working group session are attached.

Closing Plenary

There was no new business.

Next meeting

The meeting plan for the next year is:
March 14, 2016
June 13, 2016
September 19, 2016
December 5, 2016
Telecon schedule – bi-weekly Thursday 10-12 Eastern, beginning January 2016
Based upon the anticipated work load of the TORs, meetings will be Tuesday – Thursday, allowing for Monday, Friday travel. If the scope or level of work increases, the number of meeting days may be expanded.   However, for the March meeting, the plan is Tuesday through Thursday, at RTCA.

The first Working Group 3 webex meeting will be January 21st, 10 AM-12 PM eastern time

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CERTIFIED as a true and accurate summary of the meeting.

Michelle Yeh, Acting Secretary

Dave Nakamura, Chairman

Attachment, Working Group 3 Notes

Attachment

Notes: Working Group 3, Day 1

General Discussion

Thatch Vandenburg (Jeppesen) requested clarification in the MOPS with regard to the applicability of the performance standards relative to alternative presentations of information, e.g., EFB functions. The nature of an already defined Type B EFB function as a minor failure because it supplements approved functions is not always acknowledged in standards.

The discussion raised a number of thoughts. For example, if the information on the electronic display is used for navigation, whatever the platform, the standard will apply. In meeting the TORs, what is really being added to the MOPS is a higher bar standard for electronic map displays used by the flight crew to navigate. There remains the current standard where the aircraft system and architecture uses instruments and displays other than the electronic map to navigate. This electronic map is a convenience for the flight crew but not essential to the navigation operation. However, the standards here will also be raised a little e.g. display of RF legs. With the update, the MOPS is intended to be a credible standard that can be used for the presentation of navigation information supporting RNP operations.

Thatch will submit a change proposal with recommended text for the clarification he was suggesting.

Richard Jinkins clarified that part of the scope of this revision is to consider future display capabilities.

The group discussed whether classes of systems are needed. A manufacturer provided the example that when they show compliance to RTCA DO-257A, they must show compliance to all the sections (e.g., Airport moving map and vertical situation display), even if they have only one function. It's not clear that the standards are being applied correctly.

Notes: Working Group 3 Day 2 Walkthrough

Sam Miller reviewed the current RTCA DO-257A with the special committee. Richard Jinkins noted that RTCA DO-257A was developed when technology was just transitioning to displays that support GPS. Comments:

- The intended function of "situation awareness," which was appropriate when this document was created, may not be as applicable now. Some distinction may be needed between those systems that are needed to support PBN/RNP and those that are "situation awareness" only.
- Data quality requirements may be needed.
- Embedded requirements in notes need to be removed.
- Discussion addressed the currency of the appendices
  - Appendix A. Abbreviations – this needs to be updated to be consistent with the RTCA DO-283A Chg 1

- o Appendix C. Bibliography and References – this needs to be updated
- o Appendix E. Color - Sam Miller and Michelle Yeh will review this appendix.
- o Appendix F. Raster aeronautical charts – Brad Miller, Jeff Meyers, Jeff Williams, and Thatch Vandenburg will discuss and determine whether the information in this appendix can be moved into Section 2. They will also discuss whether there is a need to discuss data driven charts. Based on their recommendation, the SC leadership will need to discuss whether this content is appropriate given the current TOR or whether an update to the TOR is needed.
- o Appendix G. Raster/Pixel-Type Display Error Considerations – this appendix needs to be updated. If the formulas constitute part of the error budget, which is a quantitative part of Section 2, then this needs to be moved up to Section 2.
  - ▪ The SC discussed whether the information in this section constitutes a minimum standard. This appendix is relevant to airport moving maps but may not be relevant for PBN/RNAV. Currently, update of guidance for airport moving maps is not within the TOR.
- o Appendix H. Recommended Symbology – this appendix needs to be updated. The original table was excerpted from SAE ARP 5289, which has since been updated, and no longer shows the range of symbols in use. Dave Nakamura commented as background that it was important for manufacturers to have their symbols depicted in RTCA DO-257A because some symbols will not change due to system and flight deck consistency, as well as costs. A US DOT Volpe Center report has since documented the symbols in use for navigation aids and airports as well as lines and linear patterns for manufacturers and chart providers. The SC will consider the various sources and determine the best way for updating this appendix.
- o Appendix I. Aerodrome Characteristics – this appendix needs to be updated but it is not clear if it is within the scope of the TOR.

Change Proposal

Several change proposals have been drafted. The intent is not to make a decision about the proposals at this meeting but to present these papers for understanding and discussion. These change proposals have been prepared to reconcile RTCA DO-257A with the requirements in TSO-C165A and to update of human factors material.

It was requested that for any working group members who would like to present a change proposal, that they please provide the chair with advanced notice of the topic to be addressed.

Notes: Working Group 3, Day 3

Sam Miller led the working group through a few change proposals that have been prepared for RTCA DO-257A to provide the working group with examples of how to put together a change proposal.

- • M16-01HF Section 2.1.5.1 General
  - o Define "soft control"
- • M16-02 HF Section 2.1.5 Controls

- M16-03 HF Section 2.1.5.5 Cursor Control Devices
- M16-04 HF Section 2.1.5.6 Touch Screens
  - Touch screen guidance should be coordinated with new SAE group addressing touch screen controls (new ARP 60494). Jeff Williams will provide this link.

General Discussion

- Use of "should" vs. "shall". A "should" is a recommendation and represents "good" guidance. A "shall" is a testable requirement. A question was raised regarding whether the use of "should" vs. "shall" should be influenced by whether the application is appropriate for maneuvering vs. not appropriate for maneuvering.
- Dave Nakamura and Richard Jinkins will revise Section 1 (the introduction and scope) to address how this working group intends to distinguish between displays intended for maneuvering and those that are not.