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RTCA Paper No. 130-18/SC230-033
Date: May 22, 2018

RTCA SC-230 Meeting Minutes (May 2-3, 2018)

Attendance list:

| Name | Company |
|-----------------------------|---------------------------------|
| JEANNEAU, Charlotte* | Airbus |
| BERNUS, Christophe* | Airbus |
| <i>BULANCEA, Andrei*</i> | Airbus |
| <i>CARUHEL, Camille</i> | Airbus |
| <i>VERSTRAETE, Olivier*</i> | Airbus |
| Tschacher, Luke* | The Boeing Company |
| Nguyen, Lee | Federal Aviation Administration |
| Blake, William | Garmin |
| Gidner, Dawn | Honeywell International, Inc. |
| Lukáš, Jan* | Honeywell International, Inc. |
| Machida, Shigeru* | JAXA |
| Harrah, Steve | NASA |
| Proctor, Fred* | NASA |
| Finley, Jeff** | Rockwell Collins, Inc. |
| Hofmann, Karan | RTCA |

*Virtual

** Secretary Luke Tschacher was also available on the phone but Jeff Finley assumed secretary duties for this meeting.



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May 2 Introduction and Administrative:

The May 2 meeting opened at 9:00 a.m. at RTCA headquarters in Washington D.C. with welcome and administrative remarks by RTCA and FAA including policy on proprietary information.

Jeff Finley reviewed the agenda with the group.

A summary of January meeting minutes was provided by Jeff Finley. The minutes contained a table of 5 action items taken during the January meeting. All these items have been resolved. The meeting minutes were accepted by the group with no comments.

DO-220A Change 1 FRAC Discussion:

The technical portion of the meeting began with a summary review of the modifications which were made as part of DO-220A Change 1. Only the summary paragraph contained in the DO-220A Change 1 was reviewed.

FRAC changes requested in Section 2.0 of DO-220A Change 1 were reviewed. These changes included a modification of the title of Section 2.2.3.8 to be “Un-annunciated Failure of the Windshear Detection Function”. This change was approved.

Further changes to DO-220A Change 1 to include requirements for un-annunciated failure of airborne weather and ground mapping functions, turbulence detection function and atmospheric threat awareness functions were discussed. These three new requirements will have similar language and format to the windshear detection requirement 2.2.3.8 but the probability of un-annunciated failure of each function will be less than 1E-3. All these changes were approved.

Note that the original change suggestion for atmospheric threat awareness un-annunciated failure was for the precise value of the probability to be determined by functional hazard assessment but it was suggested by Lee Nguyen that this value be changed to be changed to 1E-3 due the situational awareness nature of the atmospheric awareness function. This change was approved.

In addition to the new requirements for un-annunciated failure of weather, ground mapping, turbulence and atmospheric threat awareness, the committee also approved creation of test procedures to support these three new requirements. These test procedures will specify using analysis to show compliance with the requirements, similar to the test procedure that supports the existing windshear detection requirement.

There was additional discussion on the vague nature of the probability value, i.e. “on the order of” but, citing previous discussion on this subject, it was decided to leave the vague language.



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The committee approved the change to DO-220A Change 1 Table 2-5 to modify the STC testing during temperature variation testing to be “after” rather than “during”.

It was noted there were two instances (Section 2.4.3.3.3 and Section 2.4.3.4.1.2.1) where database source is still an FAA website. It was agreed that these sections should be modified to reference the RTCA store as the source of these databases.

It was noted that there were no test procedures to account for requirements changes which were made to windshear caution inhibit regions as part of Change 1 for DO-220A. It was agreed that wording changes reflective of the changed requirements would be made in Section 2.4.3.3.16.

Similarly, it was noted that there were no test procedures to account for requirements changes which were made for optional automatic range scaling for windshear caution alerts as part of Change 1 for DO-220A. It was agreed that wording changes reflective of the changed requirements would be made in Section 2.4.3.3.16.

DO-213A Change 1 FRAC Discussion:

The committee reviewed the summary of modifications which were made as part of DO-213A Change 1. Only the summary paragraph contained in the DO-213A Change 1 was reviewed.

A great deal of discussion centered on DO-213A Change 1 Note 1 under Section 2.4.3.2. This note stated that sidelobe testing could be omitted from Quality Assurance/Production testing if analysis showed an equivalent level of safety without testing. One FRAC comment indicated that transmission testing is insufficient to indicate sidelobe level. Another FRAC comment recommended that the tables 2-6 and 2-7 (test angles for Quality Assurance, Production and After Repair testing) have a note added to specify “required for Class A only” to sidelobe testing in order to resolve this issue, i.e. Class A radomes would require sidelobe testing but other classes of radome would not require testing of sidelobe levels.

During discussion it was noted that radome “class” is no longer tied to radome “category” and that category level is more relevant to sidelobe level. The following text was finally approved for Note 1, “For quality assurance/production and after repair testing sidelobe testing may be omitted for Category 2 radomes if analysis shows an equivalent level of safety without testing. An equivalent level of safety analysis should include the intended operational use of the radome”. No additional notes were added to Tables 2-6 and 2-7.

A new note was added to DO-213A Change 1 Section 2.3.1.2: “The moisture affinity of the radome wall composite material can also lead to an increase of its humidity content during its service life, leading to a certain degradation of its performance over time. The manufacturer may consider additional testing to

simulate moisture ingress in the radome wall composite material by putting the whole radome in a climatic chamber under a classical wet ageing process environment (PREN3615 [13] proposes 70°/95% HR till saturation), followed by an evaluation of the impact on transmission efficiency. This information could be helpful in determining an 'end of life' estimate in conjunction with other environmental considerations."

Modification to Terms of Reference:

The committee reviewed a draft of the terms of reference which added MOPS for LIDAR and MOPS for Radar detection of high altitude ice crystals. A number of wording modifications were made and approved by the committee resulting in a "final" draft document.

Lee N. mentioned that he has a working paper which recommends adding some bits to the ADS-B Out data for weather information. Radar may be able to help populate these bits. Lee sent the working paper to Dawn G. and Jeff F.

Steve H. mentioned that NASA Glenn is doing icing research with engines. We might want to invite these researchers to future meetings dealing with engine high altitude ice susceptibility.

Camille C. mentioned that the HAIC prototype radar will be installed on the Airbus A350 flight test aircraft.

We adjourned May 2 at 4:45.

May 3 Discussions:

The May 3 meeting opened at 9:00 a.m. with review of Luke Tschacher's comments regarding DO-213 Change 1 Note 1 under Section 2.4.3.2. Luke approved of the modifications.

Since all FRAC comments were resolved, the meeting adjourned at 10:00 a.m. and reconvened at 3:00 p.m.

At the 3:00 session Jeff Finley reviewed action items. These action items are captured in the section below.

The group voted to approve submittal of the DO-220A Change 1 and DO-213A Change 1 (pending implementation of the action items below) to the PMC for approval and publication. The vote was unanimous to approve the submittal. In addition the group approved the submittal of the modified terms of reference to the PMC.

Steve Harrah reviewed flight test progress and plans with regard to high altitude icing. NASA will be flying a multi-polarization antenna in August of 2018 and will be able to present preliminary results at the next plenary meeting of SC-230.

The time and date of the next plenary meeting of SC-230 were discussed. November 6-7 were determined to be the tentative dates. Steve Harrah will investigate NASA's ability to host the next meeting. RTCA in Washington will be a backup location.

Shigeru Machida of JAXA presented information on the Mitsubishi Electric LIDAR which is being flight tested on the Boeing EcoDemonstrator aircraft.

The May 3 meeting adjourned at 4:45 p.m.

Action items:

- 1) Dawn to incorporate all suggested DO-220A Change 1 section 2 change requests except the atmospheric threat awareness function requirement should be changed to specify un-announced failure probability be less than "on the order of" 1E-3/flight hour in a manner similar to turbulence detection and weather detection/ground mapping.
- 2) Dawn to generate test procedures for the new requirements for specify un-announced failure of weather detection/ground mapping, turbulence detection and atmospheric threat awareness. These procedures will specify analysis similar to the procedure already in place for windshear detection.
- 3) Dawn to incorporate changes to Note 1 of Section 2.4.3.2 of DO-213A Change 1 to specify, "For quality assurance/production and after repair testing sidelobe testing may be omitted for Category 2 radomes if analysis shows an equivalent level of safety without testing. An equivalent level of safety analysis should include the intended operational use of the radome".
- 4) Dawn to change Table 2-5 of DO-220A Change 1 to specify "after" for STC testing during temperature variation.
- 5) Christophe to send Dawn reference for PREN3615.
- 6) Dawn to make changes to Section 2.4.3.3.3 and Section 2.4.3.4.1.2.1 for DO-220A Change 1 to reference the RTCA store as the source of database information.
- 7) Dawn to make changes to Section 2.4.3.3.16 DO-220A Change 1 test procedures to accommodate changed requirements for windshear detection caution inhibit regions.
- 8) Dawn to make changes to Section 2.4.3.3.16 DO-220A Change 1 test procedures to accommodate changed requirements for optional automatic range scaling for windshear caution alerts.
- 9) A number of changes were made to terms of reference to allow the SC-230 committee to generate a MOPS for Radar-based Detection of Ice Crystals and a second MOPS for LIDAR Detection of Clear-Air Turbulence. The group went over the details of the TOR and made a



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number of modifications to the document. Dawn will make these changes to the final document to reflect modifications captured in the meeting.

- 10) Dawn will make small editorial changes related to format and grammar to the DO-213A Change 1, DO-220A Change 1 and Terms of Reference documents to prepare the documents for publication
- 11) Steve Harrah will provide windshear database models, turbulence models and ADWRS source code to Karan Hoffman for publication on the RTCA store.