

RTCA Paper No. 310-17/SC135-717
November 29, 2017

SUMMARY OF THE SEVENTY-FIRST MEETING

RTCA SPECIAL COMMITTEE 135
ENVIRONMENTAL CONDITIONS AND TEST
PROCEDURES FOR AIRBORNE EQUIPMENT

The Seventy-first meeting of RTCA/SC-135 was held October 24th through 27th, 2017 at Wichita State University, Wichita, KS.

The following were in attendance:

Bradley Green, SC-135 Chairman
Gary Smith, SC-135 Secretary
Rebecca Morrison, Program Director*

Honeywell International, Inc.
Honeywell International, Inc.
RTCA, Inc.

Patrick Andre*
Susan Beard
Erik Borgstrom
Nick Conquest
Steve Cook*
Bill Donoghue
Mike Falzone
Pat Hall*
Chris Hart
Jim Hatlestad
Terri He*
David Jennings
Howard Jordan
David Kerr
Tim Lusha

Andre Consulting
Rockwell Collins, Inc.
Element Materials Technology
NIAR
DNB Engineering
United Technologies Corporation
Garmin Ltd.
Elite Electronic Engineering
Textron Aviation
The Boeing Company
The Boeing Company
Rockwell-Collins
Textron Aviation Beechcraft
Garmin Ltd.
D.L.S. Electronic Systems



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Donald MacDonald
Joe Marotta
Jerome Mavier
Kyle McMullen
Terry Milks
Lee Nguyen*
Marc Poncon*
Jack Prawica
Harlan Sharpe
Eric Stewart
Tim Steinbach
Aziz Tazi
Randy Tsuchiyama
Jacob VanDyke
Merrill Vaughan*
David Walen
Ken Webb

Gables Engineering
Honeywell International
Airbus
NIAR
Rockwell Collins, Inc.
FAA
Airbus
D.L.S. Electronic Systems
NIAR
Rockwell Collins, Inc.
Rockwell Collins, Inc.
Transport Canada
Teledyne
Honeywell International
Boeing
FAA
Rockwell Collins, Inc.

* via Conference Bridge

In Accordance with the Federal Advisory Committee Act, Mr. Lee Nguyen of the Federal Aviation Administration was the Designated Federal Official for this meeting.

The agenda for the meeting was as follows:

1. Chairmen’s Opening Remarks, Introductions.
2. Approval of Summary from the Sixty-Ninth Meeting – (RTCA Paper No. 280-17/SC135-716)
3. Approval of Summary from the Seventieth Meeting – (RTCA Paper No. 217-17/SC135-715)
4. Review Working Group Summaries.
5. Review Ground Based Task Group Summary



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6. Review schedule
7. New / Unfinished Business

8. Establish date for next SC-135 Meetings.
9. Closing.

(**Note:** The following report is organized by Agenda Item, although some sections were conducted out of sequence in order to accommodate some members' schedules.)

Agenda Item 1 **Chairman's opening remarks, Introductions, Recognize Federal Representative**

The plenary session of the Seventy-first meeting of RTCA/SC-135 was called to order at 9:01 AM on the 26th of October, 2017. Chairman Brad Green opened the meeting by welcoming those in attendance. Lee Nguyen was introduced as the FAA designated Federal Official for SC-135. Rebecca Morrison reviewed the RTCA Proprietary Information and membership policies, and made some general announcements. Mr. Green reviewed the agenda for the meeting, and invited attendees in the room and those attending by conference bridge to introduce themselves.

Lee Nguyen (FAA) read the Public Meeting Announcement declaring that this advisory meeting was open to the public.

Agenda Items 2 and 3 **Approval of the Summary from the Sixty-Ninth and Seventieth Meetings**

SC-135 Secretary Gary Smith read the minutes from the 69th and 70th meetings, RTCA Paper No. 28017/SC135-716 and 217-17/SC135-715. A motion was made and seconded to accept the minutes as read, and the motion was approved unanimously.

Agenda Item 4 **Review Working Group Summaries**

The Working Group discussions were centered on the Change Proposals submitted for Revision H.



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The Change Coordinators described Change Proposals which were reviewed and dispositioned in their respective group meetings. The level of detail in the Plenary session discussions precludes accurate reporting here, so only change proposals creating significant discussion are noted. The actual Change Proposals and any dispositions are found on the SC-135 Workspace and tracked in the Change Proposal Tracking Log, also found on the Workspace.

Sections 1, 2 and 3 – David Kerr, Change Coordinator.

A Change Proposal regarding an exemption for low-temperature testing was rejected. There was subsequent discussion on test condition tolerances, e.g. temperatures and applied power. The summary of the discussion is that tolerances need to be consistent across all sections.

Sections 7 and 8, Merrill Vaughan, Change Coordinator.

The shock test pulse figure has been updated. A Change Proposal regarding the use of a dummy mass to represent components within or on an equipment case in the Crash Safety – Sustained test was accepted. The list of minimum requirements for test reports has been updated.

Sections 9, 10, 11 and 14 – Harlan Sharpe, Change Coordinator.

Change Proposals for updating Figures in the respective Sections were discussed but were withdrawn for correction.

CP H-31 regarding shaking the EUT following the Drip Proof test was rejected, with the guidance to re-submit as a CP for the User Guide. Further discussion followed regarding water retained in EUTs, and whether the presence of such water constitutes a failure. The consensus was that this is an EUT performance specification and not a DO-160 test requirement, and that this subject may affect other Sections such as Humidity and Fluids Susceptibility.

The Fluids list in Section 11 was discussed, and a proposal for removing some fluids will be submitted at the next meeting.

CPs H-103 and H-104 regarding Salt Fog testing were rejected. An idea surfaced that a new category for a more severe test may be added to Section 14.

Section 16 – Joe Marotta, Change Coordinator.

Summary of Section 16 WC group meeting:

4 Change proposals were discussed.
2 CPs were accepted

1 CP was rejected 1
CP was deferred.

Sections 15 and 18 – Ken Webb, Change Coordinator.

No Change Proposals for Section 15.

Eleven CPs for Section 18 were discussed.

- H-26r1 was rejected and recommended for the User Guide
- H-32r1, H-48, H-49, UG-05, UG-06 and an new (not yet numbered) CP were accepted as modified.
- H-80 was deferred and will be submitted as H-80r1.
- 3 new CPs were submitted but have not yet been discussed.

Additional work for these Sections includes updating Figures, test report requirements, addressing tolerances, and ensuring that all Errata have been corrected in Rev H.

Sections 19 and 20 – Jim Hatlestad, Change Coordinator. No Change Proposals were dispositioned.

Section 21 – Nick Conquest, Change Coordinator.

One new Change Proposal regarding multiple antenna positions was submitted.

Section 22 – Eric Stewart, Change Coordinator.

3 new Change Proposals were reviewed. CPs for ground plane dimensions on pin injection tests and a change to the pin injection test procedure were rejected. A CP regarding testing power leads when the power return is not locally grounded was accepted as modified.

The latest Section 22 draft for Rev H was reviewed. Tables and figures have been updated, more options for meeting power pin injection requirements were added, and wording was changed to remove confusion on what to do when limit levels are reached before the required test levels during the test. A new cable induction procedural step was added, to drive to the required current test level into a resistive load and to record the generator setting required to achieve that level.

Eric Stewart reported on the SAE AE-2 committee work. So far only WF1/WF2 has been evaluated by the committee. Next step is to review the other waveforms

Additionally, SAE has created a task group to prepare a new Aerospace Information Report (AIR) which will provide guidance for applying aircraft equipment electromagnetic, electrical, and mechanical qualification standards, including RTCA/DO-160, MIL-STD-461, MIL-STD810, and MIL-STD-704, to civil aircraft certification intended for military use, and for



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military aircraft equipment installed on civil aircraft. The guidance will identify where the equipment environmental qualification standards meet the intent of the civil or military aircraft certification requirements. Conversely, the guidance will identify where the equipment environmental qualification standards have differences that do not meet the intent of the civil or military aircraft certification requirements and when these differences matter based on equipment criticality. The task group has scheduled a kickoff meeting for January, 2018.

Section 23 – Steve Cook, Change Coordinator.

Digital camera standards are under review by EUROCAE.

Agenda Item 5 **Review Ground Based Equipment Task Group Summary**

Kyle McMullen described the work this group has undertaken since the approval of the Inter-Special Committee Requirements Agreement 228-ISRA-004. The task is to create a document that specifies ground based environments and the procedures required to test equipment supporting Unmanned Aerial Systems (UAS) installed in those environments. The document would fall under SC-135 and be treated as a Working Group led by Kyle. It would follow the format of DO-160 with Change Coordinators for the different sections. An aggressive schedule has been laid out starting with the kickoff meeting held in October, 2017, and leading to the content being completed by the end of 2019 and ready for FRAC and balloting in early 2020. Volunteers are being solicited for help with the different sections.

During this discussion, Ken Webb asked for Workspace folders to be created for this new effort. Rebecca Morrison recommended uploading documents in PDF format to maintain control of the content. Gary Smith stated that Change Proposals should be submitted in .doc/.docx format in order to allow him to add index numbers and update any status changes.

Agenda Item 6 **Review Schedule**

Chairman Green addressed the schedule during the discussion of the ground based equipment document. Based on the Revised Terms of Reference (TOR), SC-135 has committed to releasing DO160H and the Revision to DO-357 by December, 2021. This is a change of 2 years from the original schedule and will allow for concurrent work on the new document for environmental testing of UAS Ground Based Equipment.



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Agenda Item 7

New/Unfinished Business

- **Alignment of Change Proposal Dispositions between EUROCAE WG-14 and RTCA SC135.** EUROCAE Chairman Marc Ponçon prepared a summary of Change Proposals (CPs) recorded to date, and the status of their dispositions. Fewer than half the CPs recorded in the Tracking Log show indication of review activity by either committee. Marc initiated the activity to start reconciling the dispositions by color-coding CPs by their review status. The CPs which have either been rejected or accepted by both groups were reviewed and identified as such, so these will need to be reviewed again. This exercise revealed that we have not achieved good discipline with indicating current CP status in either the Tracking Log or in the copies of CPs posted on the Workspace.
- Ken Webb asked for a simple, 1-page guide to using the Workspace, to include guidance on how to find SC-135 files, where to place files, the use of PDFs, and guidelines for posting and uploading.
- Brad Green asked for an ad hoc Working Group to be formed to establish guidelines for figures going into Rev H and the User Guide. Guidelines would include recommended sizes and resolution for graphics, aspect ratio, file format (e.g., Visio, .docx or PDF), font type & size, callouts, notes, etc. David Kerr will lead the group, and Harlan Sharpe, Nick Conquest, Gary Smith and Kyle McMullen will contribute.

Agenda Item 8

Establish Date for Next SC-135 Meeting

The next SC-135 meeting will be held at the RTCA Headquarters in Washington, DC. Dates of the meeting will be from Monday, April 23rd through Thursday, April 26th, 2018.

Agenda Item 9

Closing and Adjourn

Brad Green asked for a motion to adjourn the meeting. A motion was offered, seconded, and unanimously approved. The meeting was adjourned at 10:48 AM on Friday, October 27th, 2017.

Certified as a true and accurate summary of the meeting.



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Secretary