TERMS OF REFERENCE
Special Committee (SC) 230
Airborne Weather Detection Systems
Revision 13

REQUESTORS:

Organization	Person
FAA Associate Administrator for Aviation Safety	**Ms. Peggy Gilligan**

SC LEADERSHIP:

Position	Name	Affiliation	Telephone	email	Change
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BACKGROUND:

RTCA/DO-220 provides the current Minimum Operational Performance Standards for Airborne Weather Radar with Forward-Looking Windshear Capability. It was published in 1993, with Change 1 added in 1995. Since then, significant technological advances in weather radar systems have occurred, but the MOPS has not been updated to accommodate these improvements. Modern weather radar systems may also include turbulence detection or other related features and functions that are not currently addressed by the MOPS. Revised guidance will enable a more efficient and standardized certification approach across the industry.

In April 2013, the FAA tasked an Industry Working Group to develop recommendations for an advisory circular for airworthiness approval for aircraft weather radar systems. The Industry Working Group recommended revising the outdated RTCA/DO-220 and DO-220 Change 1 to update the minimum operational performance standards for aircraft weather radar equipment.

(2015-03-17) - During the plenary meetings of SC-230, various committee members requested that the committee consider also revising DO-213, Minimum Operational Performance Standards for Nose-Mounted Radomes. The committee leadership agreed that DO-213 should be updated, and that it is appropriate to include that task under the Terms of Reference for SC-230.

(2015-06-16) - At the SC-230s fourth plenary meeting, the committee discussed the EUROCAE Working Group 95 (WG-95) new subgroup for long-range awareness of icing conditions.

WG-95 subgroup would create a report on the feasibility to standardize In-Flight Ice Crystals Long Range Awareness capabilities by Weather Radar (WXR), with at least the following objectives:

1) Consider the impact of the new icing atmosphere characterized by the Appendix "D/P" definition introducing the Ice Crystals and mixed Icing conditions.

2) Describe intended function of Ice Crystals Long Range Icing Awareness functionality by Weather Radar and the Operational need of such function.

3) Identify possible standardization activities of short-term functionalities, with the definition of minimum acceptable performance and validation and verification approach.

4) After 12 months, describe the maturity of the Ice Crystals Long Range Icing Awareness function by Weather Radar and provide recommendations on the way forward of the sub-group and the way to standardize Icing WXR functions using new or existing EUROCAE / RTCA documents.

The RTCA SC-230 members have expressed an interest in supporting this activity and would like to contribute to the feasibility report in a first step.

In order to accommodate this interest from SC-230 members, the leadership of SC-230 agreed that the duties of this committee should be extended beyond the publication of DO-220A and DO-213A, to allow SC-230 to contribute to the long-range icing awareness feasibility report as described above.

(2017-03-08) – since the publication of DO-213A and DO-220A in March of 2016, a few errata and opportunities for clarification were identified in each document. As companies start to use these documents for certification more issues may arise. RTCA SC-230 would examine the reported issues and incorporate into a Change 1 for both documents.

(2018-06-21) – Subsequent to the creation of the Feasibility Study on Weather Radar for Ice Crystal Detection, the RTCA sent a letter to their industry partners to assess the need for radar detection of high-altitude ice crystals, and to query the level of support for related follow-on activities. The feasibility report recommended that:

- additional research be conducted to better assess susceptibility of engines to high altitude ice,
- additional research data be gathered for evaluation and validation of icing detection methods, and
- development of meteorological models be initiated for development and validation of the icing detection function.

The respondents were supportive of continued research into the operational needs and benefits of radar-based ice crystal detection, the development of models that can assist in the development and validation of such systems, and the definition of a path to certification for this type of radar-based function. To this end, SC-230 updated DO-220A Change 1 to define the specifications for a radar-based ice crystal detection function.

SC-230 was asked by the Japan Aerospace Exploration Agency (JAXA), Mitsubishi Electric Corporation, and others to create a requirements document (MOPS) for airborne LIDAR systems. As a first step, SC-230 undertook a feasibility study to determine realistic goals for an airborne LIDAR system for use as a clear air turbulence detection function, and to assess the ability of LIDAR to meet aircraft manufacturer needs for the detection of clear air turbulence.

(2020-06-11) The Feasibility Study Airborne LIDAR for Clear Air Turbulence (CAT) Detection was completed. It concluded that LIDAR using current technology is not capable of meeting goals for CAT detection.

(2023-04-13) DO-220B has been completed. This revision adds requirements and verification details for a new function: Indication of High-Altitude Ice Crystal conditions.

DELIVERABLES:

Product	Description	FRAC Completion Due Date*	Change
White Paper	Perform analysis and test to determine susceptibility of airborne weather radar systems to radio frequency interference.	Dec 2024	

*Note: Final Review and Comment (FRAC) Completion Due Date refers to the date that the committee plenary approves the document after completing the FRAC Process. SCs should submit the final document at least 45 days before the Program Management Committee (PMC) meeting where it will be considered for approval.

SCOPE and COORDINATION:

For airborne weather radar spectrum interference:

Determine susceptibility of airborne weather radar to spectrum interference including:

- Interference anticipated from future adjacent-band international mobile telephony.
- Other X-band transmission sources including ground-based and air-based sources.
- Characterize radio frequency (RF) interference currently being experienced by airborne weather radar. Describe the impact of increased RF interference levels on radar operation. Make recommendations for spectrum interference levels.

The committee is continuing to investigate the following topics:

- radar detection of volcanic ash,
- updates to the predictive windshear functionality to accommodate modern aircraft characteristics, and to include additional types of aircraft,
- requirements for automatic weather detection and display.

Based on the outcome of these investigations, additional deliverables may be identified for inclusion in this ToR.

ENVISIONED USE OF DELIVERABLE(S)

The white paper may be used to develop standards and policy for in-band and out-of-band X-band transmission sources including airborne weather radar and future international mobile telephony including:

a. Power level and siting requirements for momentary in-band noise sources such as nearby X-band radar transmitters.

b. Power level, antenna pointing and/or siting criteria for out-of-band noise sources such as telecommunications towers near airports.

SPECIFIC GUIDANCE:

Coordination with RTCA SC-239 – Low Range Radar Altimeter and SC-242 – Spectrum Compatibility, if and as appropriate.

1. Characterize current RF environment between 9.3 and 9.5 GHz.
2. Document operational impact of increased in-band and out-of-band noise/radio frequency interference (RFI) levels on X-band airborne weather radar systems.
3. Make recommendations for limiting interference levels from in-band/out-of-band RFI and transmission sources. These recommendations may include, but are not constrained to:
    a. Signal in space interference tolerance mask for weather radar.
4. Potential RFI mitigation strategies for future airborne weather radar systems.

EUROCAE Coordination – This is an independent advisory committee, not a joint RTCA/EUROCAE committee. Coordination with EUROCAE will be undertaken, as appropriate.

Documents	**Intended Use**
SC-239 White Paper: Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter Operations	Provides an example analysis of interference tolerance of currently fielded equipment.
SC-239 White Paper: Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter Operations Errata 1	Provides an example analysis of interference tolerance of currently fielded equipment.

TERMINATION:

When the scope of this Terms of Reference is complete, the committee will recommend to the PMC that the committee Sunset, go into Active Monitoring Mode, or spend a period of time in Hiatus. Any change/extension of the committee's work program requires prior PMC approval.