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Superseding ARP4102/11B

(R)

Airborne Windshear Systems

RATIONALE

This document has been reaffirmed to comply with the SAE 5-Year Review policy.

1. SCOPE:

This document recommends criteria for Airborne Windshear Systems, including operational objectives, characteristics, and functional requirements.

The recommendations in this document apply to transport aircraft, and describe the operational objectives of windshear alerting systems, situational displays, guidance systems, and avoidance/detection systems.

2. REFERENCES:

2.1 Applicable Documents:

This document should be used in conjunction with the ARP4102 Core Document. The following documents may also be applicable:

- a. SAE S-7 ARP4102/4 Flight Deck Alerting System
- b. SAE S-7 ARP4102/7 Electronic Displays
- c. FAR 121.358 Low Altitude Windshear System Equipment Requirements
- d. AC 25-12 Airworthiness Criteria for the Approval of Airborne Windshear Warning Systems in Transport Category Airplanes
- e. RTCA Document DO-220 Airborne Short Range and Long Range Windshear Predictive Systems (Version 10.2)

2.2 Definitions:

- 2.2.1 Airborne Windshear System: System or systems which alert(s) the crew to the presence of windshear either before or when the phenomenon is encountered. The system may also provide guidance to avoid or escape from the hazard. The following types of systems may be integrated or independent:

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SAE WEB ADDRESS:

- 2.2.1.1 Reactive Windshear System: A system which senses and identifies the presence of windshear AFTER the phenomenon is encountered.
- 2.2.1.2 Predictive Windshear System: A system which senses and identifies windshear before the actual encounter. It should be composed of a short range predictive alerting system and a long range predictive alerting system in order to increase awareness of the proximity of the encounter and for timely alerting.
- 2.2.1.3 Short Range Predictive Alerting System: A system which senses and identifies windshear SHORTLY BEFORE an encounter, such that pilot action may preclude or mitigate the encounter.
- 2.2.1.4 Long Range Predictive Alerting System: A system which senses and identifies windshear FAR ENOUGH IN ADVANCE of a possible encounter to allow the crew to consider maneuvering away from the hazard. Such a system shall include display(s) to assist the crew with identification of the hazardous area.
- 2.2.1.5 Airborne Windshear Flight Guidance System: A system which provides the crew with flight guidance to improve recovery probability in a windshear encounter.
- 2.2.1.6 Airborne Windshear AutoFlight Recovery System: A system which integrates or couples the autopilot and the autothrottle systems of the aircraft with an Airborne Windshear Flight Guidance System.
- 2.2.2 Alerts of Airborne Windshear Systems:
 - 2.2.2.1 Windshear Alert Threshold: The defined level of windshear metric or metrics above which one or another of the windshear (caution, warning) alert is triggered.
 - 2.2.2.2 False Alert: An alert which occurs when the design windshear threshold conditions do not exist.
 - 2.2.2.3 Windshear Caution: An alert which is set at a pre-determined windshear level or at a pre-determined predicted time to encounter the windshear to provide immediate crew awareness for possible subsequent corrective action. (Abnormal Condition, Level Two, ARP4102/4)
 - 2.2.2.4 Windshear Warning: An alert which is set at a pre-determined windshear level or at a pre-determined predicted time to encounter the windshear requiring immediate corrective action by the crew. (Emergency Condition, Level Three, ARP4102/4)
 - 2.2.2.5 Attenson: A coined word intended to denote a unique sound selected for its "attention-getting" capability (Reference ARP4102/4).

3. OPERATIONAL REQUIREMENTS:

(Refer to Figure 1)

3.1 General:

3.1.1 Windshear Alert Threshold (in the energy loss sense - altitude and airspeed) should be set to levels of tailwind or headwind shear components and energy loss levels due to vertical downdrafts as specified in AC 25.12 and its accompanying documents for reactive systems, and set to the time-to-encounter requirements of RTCA Document DO-220 and its accompanying documents for predictive systems.

3.1.2 Windshear Caution:

3.1.2.1 A Windshear Caution shall provide an alert of increasing performance shear for reactive windshear systems and provide a timely alert for a predictive windshear system which exceeds the thresholds specified in the documents noted in 3.1.1 so that an encounter can be avoided.

3.1.2.2 Windshear Cautions shall continue for a finite time unless superseded by a Warning Alert, then cease if the conditions which initiated the alert no longer exist, and may be cancelable after alerting.

3.1.2.3 Windshear Cautions pertain to reactive windshear systems and long range predictive alerting Systems.

3.1.3 Windshear Warning:

3.1.3.1 A windshear warning should activate on detection of measured windshear experienced by the aircraft or which the aircraft is about to enter which exceeds the threshold specified in the documents noted in 3.1.1.

3.1.3.2 Windshear warnings should cease when adverse conditions no longer exist. Adverse conditions include, but are not limited to, the conditions which initiate the alert. Additional criteria, such as attainment of a minimum altitude or a finite timespan (e.g., 30 s), may be applicable to the cessation of alerts. See Section 6 for aural, visual, and voice alerts.

3.1.3.3 The windshear warning alert should not be cancelable by the flight crew.

3.1.3.4 Windshear Warnings apply to Reactive and Short Range Predictive Alerting Systems.