



International Civil Aviation Organization
Asia and Pacific Office

**Twenty-fourth Meeting of the Asia Pacific Regional Aviation Safety Team
(APRAST/24)**

(Bangkok, Thailand, 01 to 05 December 2025)

Agenda Item 5: Presentations – States/ Industry/ICAO

RESPONDING TO SPACE WEATHER (SOLAR RADIATION) VULNERABILITY

(Presented by the Secretariat)

SUMMARY

A recent uncommanded pitch-down event involving an Airbus A320 prompted the issuance of an Emergency Airworthiness Directive. Investigations also identified a vulnerability in the flight control computer to intense solar radiation, highlighting operational risks posed by space weather. States and Administrations are encouraged to review the applicability of the AD to their fleets, ensure timely communication with operators and maintenance organizations, and integrate relevant Space Weather Centre (SWXC) advisories into operational decision-making.

The Meeting is invited to consider the actions proposed in Section 3.

1. INTRODUCTION

1.1.1 This paper presents an urgent safety concern related to the effects of space weather on aircraft systems. A recent event involving an A320 resulted in an uncommanded, limited pitch-down while the autopilot remained engaged. Although the aircraft recovered without further incident, several occupants sustained injuries.

1.1.2 The preliminary investigation identified a malfunction of the Elevator Aileron Computer (ELAC). The issuance of an Emergency Airworthiness Directive (AD) reflects the seriousness of the issue, with subsequent analysis by the manufacturer linking the anomaly to susceptibility of certain hardware and software configurations to intense solar radiation. This paper also introduces relevant ICAO guidance, specifically Doc 10100 and the operational use of SWXC advisories.

2. DISCUSSION

2.1 Incident Details – Flight Control System Vulnerability

2.1.1 An Airbus A320 aircraft recently experienced an uncommanded and limited pitch-down event. The autopilot remained engaged throughout, and the aircraft lost only a small amount of altitude before stabilizing; however, several passengers and crew were injured. Under different circumstances, such an event could potentially lead to more serious outcomes.

2.1.2 The preliminary technical assessment conducted by Airbus identified a malfunction of the Elevator Aileron Computer (ELAC) as a contributing factor. As the State of Design of A320, European Union Aviation Safety Agency (EASA) issued Emergency AD 2025-0268-E in response. This issue affects aircraft worldwide, including major operators in the APAC region.

2.1.3 As referenced in the Emergency AD, Airbus Alert Operators Transmission (AOT A27N022-25) identifies the specific root cause as a vulnerability in the ELAC software/hardware configuration when exposed to intense solar flares and cosmic radiation (space weather). Such exposure can result in a Single Event Upset (SEU), corrupting critical flight control data.

2.1.4 Given the severity of the failure mechanism and its potential to escalate into more serious incidents or fatal accidents, the ICAO APAC Regional Office considers it important to draw the attention of States/Administrations in the region to this risk.

2.2 Risks due to Solar Flare

2.2.1 ICAO Annex 3 establishes a foundational layer of protection against space weather impacts through the global network of Space Weather Centres (SWXCs). These centres provide continuous monitoring, detection, and prediction of space weather events affecting four key areas: HF communications, satellite communications, GNSS-based navigation, and radiation exposure at flight levels.

2.2.2 In the recent A320 incident, elevated solar radiation levels occurred - conditions that the SWXCs are designed to monitor and issue advisories for when thresholds are exceeded, in accordance with Annex 3. These advisories, provided to Area Control Centres, flight information centres, aerodrome meteorological offices, and other operational users, support States and operators in making timely tactical decisions for flight planning and risk mitigation.

2.2.3 The potential impacts of solar radiation on avionics are described in ICAO Doc 10100 (SWIS Manual), including:

2.5 SOLAR RADIATION STORMS

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2.5.8 Semi-conductors in avionics can malfunction during these events in a seemingly random manner. Single event upsets may cause a reset to a computer system. Over the long term, radiation damage may hasten failure of the chip.

2.3 Regional Preparedness and Recommended Follow-up

2.3.1 States/Administrations are encouraged to review the applicability of the Emergency AD to their fleets and ensure timely communication with air operators and Approved Maintenance Organizations (AMOs) regarding embodiment of the AD.

2.3.2 In collaboration with EASA, ICAO APAC Regional Office broadcasted a virtual meeting organized by EASA Certification Office to provide APAC States/Administrations with an overview of the actions taken by EASA on 28 November 2025 and explanation regarding the Emergency AD.

2.3.3 States/Administration should verify that SWXC advisories are effectively integrated into operational decision-making processes within meteorological service provider, Air Traffic Management, and air operators.

2.3.4 States/Administration may request support from ICAO APAC Regional Office regarding AD implementation or interpretation of SWXC advisories to enhance regional situational awareness and collaboration.

2.3.5 States/Administration are further urged to report any similar anomalies or difficulties in implementing the AD or interpreting SWXC advisories, to support improved regional situational awareness.

3. ACTION BY THE MEETING

3.1 The Meeting is invited to:

- a) Note the information on this paper.
- b) Discuss potential difficulties regarding AD compliance.
- c) Share information regarding design philosophy and radiation susceptibility.

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