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Eleventh Meeting of the Asia Pacific Accident Investigation Group (APAC-AIG/11)

(Singapore, 16 – 17 August 2023)

Agenda Item 4: Enhancing Accident Investigation Capabilities

DYNON SKYVIEW HDX DATA DOWNLOAD TECHNIQUES

(Presented by the Australian Transport Safety Bureau)

SUMMARY

This paper aims to share lessons learnt regarding electronic data recovery techniques from an ATSB in-flight break-up investigation.

1. INTRODUCTION

1.1 On 23 April 2021, a Van's Aircraft RV-7A, registered VH-XWI, was being operated on a private flight under the visual flight rules (VFR) from Winton to Bowen, Queensland. About 2 hours after departing Winton, and about 90 km south of Charters Towers, the aircraft sustained an in-flight break-up. The pilot was fatally injured, and the aircraft was destroyed.

1.2 A *Dynon SkyView HDX* display was recovered from the accident site, and flight data was initially recovered up to about 90 seconds prior to the in-flight break-up. Due to the limited available data, further examination and data recovery investigation was required to seek additional recorded data from the *Dynon SkyView HDX* solid state memory.

2. DISCUSSION

2.1 Initial examination at the accident site displayed strong evidence of an in-flight break-up. The wreckage was distributed over about 1.5 km. Smaller and lighter sections of wreckage were found to the north-west, in the direction of the local winds at the time, and the heavier items to the south-east.

2.2 Initial electronic data provided by the electronic flight bag manufacturer stopped recording shortly after departure from Winton. ADS-B data from *Aerion* was requested. This data detailed the flight in more detail, and highlighted several flightpath excursions along the planned track. Unfortunately, the *Aerion* data's last few parameters from the aircraft's ADS-B data were erratic, most likely due to line-of-sight limitations with the associated antennas during the in-flight break-up sequence.

2.3 The aircraft's *Dynon SkyView HDX* primary flight display contained a 16GB M.2 NVMe solid state memory device, which was initially downloaded most likely utilising a computer with a Windows 10 operating system. About 90 seconds of the flight were not accounted for. After discussions with the ATSB data recovery team, another data recovery attempt was made with a computer that utilised a LINUX operating system. This enabled a further 70.5 seconds of reliable data to be extracted, greatly assisting the investigation in identifying the events during the final stages of flight.

2.4 It was considered that during the in-flight break-up and sudden loss of power to the *Dynon SkyView HDX*, the filesystem did not finalise recent writes to the disk. When unexpected power-down events occur, and disk operations are not finalised, these operations can be reconstructed using the information stored in the journal. Windows software that allows reading of these filesystems (ext3) likely does not have the ability to repair the filesystem from the journal, which was automatically conducted when connected to a Linux system, allowing for the recovery of the additional 70.5 seconds of data.

3. ACTION BY THE MEETING

3.1 The Meeting is invited to note and encourage the sharing of investigation techniques for future investigation support amongst the member States.

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