

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR22LA251

ONBOARD IMAGE, AUDIO AND DATA RECORDER

Specialist's Factual Report

February 24, 2023

A. ACCIDENT

Location: Salt Lake City, UT
Date: July 13, 2022
Time: 18:50 mountain daylight time (MDT)
Airplane: Cessna 208B, N877FE

B. ONBOARD IMAGE, AUDIO AND DATA RECORDER SPECIALIST

Specialist: Sean Payne
Sr. Engineer
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A data group was not convened. The NTSB Vehicle Recorder Division received the following device:

Recorder Manufacturer/Model: Appareo Vision 1000
Recorder Serial Number: VIS-FGZA

1.0 Device Description

The Appareo Vision 1000 device is a small self-contained image, audio, and data recorder. The unit is typically mounted in the overhead panel of the aircraft's cockpit and records an image at a rate of four times per second with its internal camera. The device is also capable of recording two tracks of audio that are synchronized with the image data. A GPS receiver is included that receives GPS satellite-based aircraft time, position, altitude, and speed. The Appareo unit also has a self-contained real-time inertial measuring unit that records 3-axis acceleration, and derived pitch, roll and yaw data.

Two independent audio tracks can be recorded. One track is the internal microphone for the device. The second track can be wired to an external microphone. In this installation one input was determined to be the helicopter's intercom and recorded pilot and crew communication. The other track only picked up very loud engine and/or transmission sounds from the helicopter and was determined to have been recorded by the Vision 1000's internal microphone.

The Appareo unit records the image, audio and parametric data on a removable SD¹ memory card that is inserted into the unit. Depending on card size, this removable memory retains approximately the last two hours of image and audio

¹ SD – Secure Digital – A type of nonvolatile memory card used extensively in portable devices.

data and about the last 100 hours of parametric data. In addition to the removable memory the Vision 1000 is also equipped with a memory module that is mounted internal to the unit. This internal memory contains an exact duplicate of the data stored on the removable card.

The Appareo unit on this aircraft was connected to the aircraft's electrical bus. Any time the battery switch is turned on the Appareo unit will start to record audio, images and data. The Vision 1000 unit creates a new file for every electrical power application and can create multiple files for the same power cycle if the recording time exceeds a certain time limit.

1.1 Data Recovery

The device appeared undamaged and is pictured in Figure 1.

The device has two memory storage devices. One memory storage device is the removable SD card and the other memory storage device is the unit's internal memory. A properly functioning Appareo Vision 1000 device will write data simultaneously to the removable SD card as well as the internal memory device.



Figure 1. Photo of the Vision 1000 undamaged as received by the NTSB Vehicle Recorder Division.

Removable SD Card

A properly functioning removable SD card associated with this device should contain a drive consisting of a raw version of the recorded data, as well as a virtual drive of converted files that are playable within the manufacturer's software playback utility.

The card behaved normally and contained both raw files and converted virtual drive files. The virtual drive files were first played in the manufacturer's software. The

last flight record indicated the recording was made in May 2020. The accident occurred in July 2022. The accident flight was not recorded on the virtual drive files.

The raw files on the removable SD card were then converted using the manufacturer's software. After conversion, these files were congruent with the files recovered from the virtual drive (discussed above).

The accident flight was not captured on the SD card.

Internal Memory

The manufacturer has specified a procedure to pull data from the unit's internal memory. This process consists of formatting an exemplar "surrogate" removable SD memory card with a software file that commands the unit's internal memory to write to removable SD memory card. For this exercise, a manufacturer supplied a branded (Appareo Brand) removable SD card, which was formatted with a dump file commanding the accident unit to dump its internal memory. The device was powered on a test bench and appeared to function normally. The process lasted approximately two hours, and the unit indicated that successful transfer of the internal memory contents to the removable surrogate SD card had taken place.

The removable surrogate SD card was then read on a PC. The contents were congruent with a successful memory dump and consisted of a number of raw files. These raw files were then converted using the manufacturer's software.

A review of the converted files showed that the last recording on the internal memory was made on November 11, 2020. The accident occurred in July 2022. The accident flight was not captured on the internal memory.

1.2 Recording Description

No data relevant to the accident was recovered from the device.

1.3 Discussion with the Operator Regarding Usage of the Vision 1000

The NTSB operational factors investigator discussed with the operator the intended usage and maintenance practices related to the Appareo Vision 1000. The operator did not offer any details on their usage or maintenance practices related to the device.

Submitted by:

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