

National Transportation Safety Board

Office of Research and Engineering

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ONBOARD IMAGE RECORDER

Specialist's Factual Report

January 30, 2024

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A. ACCIDENT

Location: Hammonton, New Jersey
Date: December 19, 2023
Time: 2004 eastern standard time (EST)
Helicopter: American Eurocopter AS350B2, N606HD

B. ONBOARD IMAGE RECORDER SPECIALIST

Specialist: Gerald Kawamoto
Electronics Engineer - Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A group was not convened. The NTSB Vehicle Recorder Division received the following onboard image recorder:

Recorder Manufacturer/Model: Appareo Vision 1000
Recorder Serial Number: Unknown

1.0 Device Description

The Appareo Vision 1000 is a self-contained image, audio, and data recorder. The device 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. A GPS receiver is included that receives GPS satellite-based aircraft time, position, altitude, and speed. The device 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, depending on installation and configuration. One track is from the internal microphone of the device and the second track can be wired to an external audio source, such as the helicopter's intercom.

The device records image, audio, and parametric data on a removable SD memory card. Depending on card size, removable memory retains approximately the last two hours of image and audio data and the last 100 hours of parametric data. In addition to the removable memory, the device contains an internal non-volatile flash memory chip whose contents mirror that of the removable SD card.¹

¹ Non-volatile memory (NVM) is semiconductor memory that does not require external power for data retention.

In a typical installation, the device is connected to the aircraft's electrical bus. Any time the battery switch is turned on, the device will start to record audio, images, and data. The device creates a new file for each application of electrical power and may create multiple files for the same power cycle if the recording time exceeds a certain time limit.

1.1 Data Recovery

The device sustained severe heat damage, as shown in figure 1. An SD card, as shown in figure 2, was recovered from the wreckage, however, no card was installed in the device's SD card slot.

The internal NVM chips were removed from the Appareo Vision and read out using laboratory tools.

The internal chip was removed from the plastic SD card housing and read out using laboratory tools.



Figure 1. Front and back of the Appareo Vision 1000 as received.

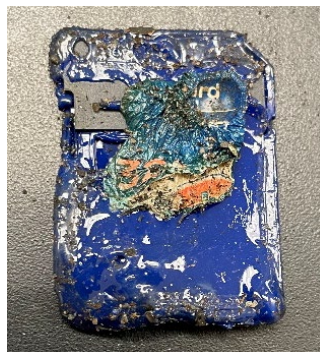


Figure 2. SD card recovered from wreckage.

1.2 Recording Description

The contents of the internal NVM chips were reviewed and the only historical data present were 532 images, the equivalent of 2 minutes and 13 seconds of data at a 4 frames per second rate. The images showed a laboratory bench, as shown in figure 3. No tabular parametric data were present. The contents indicate that the device was not powered on during the accident flight, thus no accident-related data were recovered.

The SD card contained 3 video files from an image recorder mounted on the exterior of the helicopter. The data file format was inconsistent with data files typically generated by an Appareo Vision, therefore it was determined that the SD card was not installed in the device. The timestamps from the image files were from April 6, 2022, recorded time and were not relevant to the accident event.

Submitted by:

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Electronics Engineer - Recorder Specialist

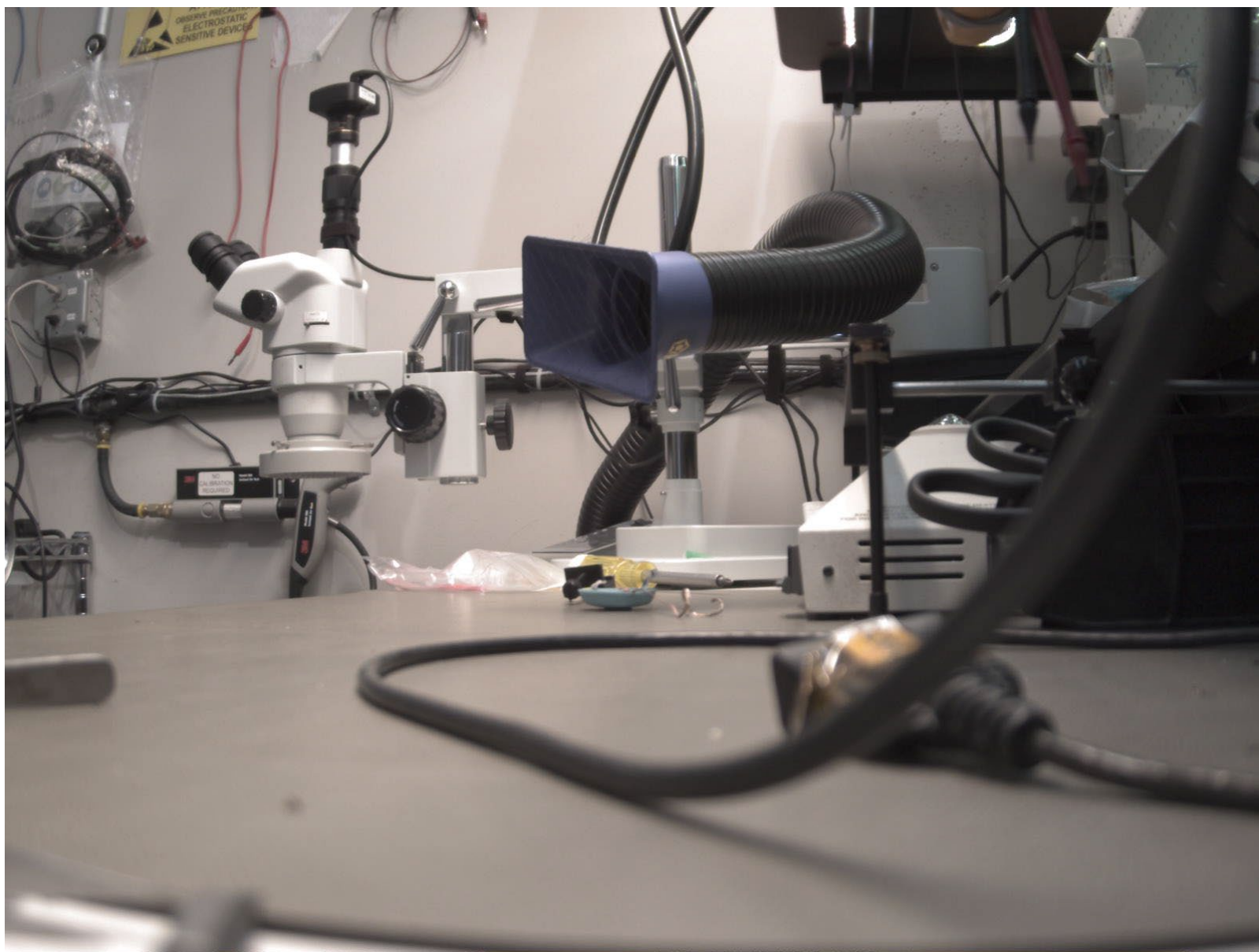


Figure 3. Example of an image recovered from the internal non-volatile memory chips of the Appareo Vision.