

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA22FA343

ONBOARD IMAGE AND PARAMETRIC DATA RECORDER

Specialist's Factual Report

October 6, 2022

A. ACCIDENT

Location: Andalusia, AL
Date: July 29, 2022
Time: 15:02 EST
Helicopter: Eurocopter AS 350 B2, N124LN

B. ONBOARD IMAGE AND PARAMETRIC DATA RECORDER SPECIALIST

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C. DETAILS OF THE INVESTIGATION

The NTSB Vehicle Recorder Division received the following onboard recorder:

Device Manufacturer/Model: Appareo Vision 1000
Device Serial Number: VIS-FGBJ

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 of aircraft's cockpit and records a cockpit image at a rate of four times per second. In addition to cockpit images, the device is also capable of recording two tracks of audio that are synchronized with the image data. The unit also contains a GPS receiver that receives GPS satellite-based aircraft time, position, altitude, and speed. In addition to the GPS position, the Appareo unit also has a self-contained real-time inertial measuring unit that provides 3-axis accelerations as well as aircraft pitch, roll and yaw data.

The two recorded audio tracks can be wired to record the following inputs: an external audio source such as the aircraft's intercom or radios and audio picked up by a microphone mounted internal to the Vision 1000 unit. In this installation no external aircraft audio was connected to track one and the track two microphone only picked up very loud engine and/or transmission sounds from the helicopter.

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 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.

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

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.

2.0 Device Description

The device was in good condition and is pictured in figure 1 as received by the NTSB lab. The device contained an internally mounted 16 GB SD card. The SD card is shown in figure 2. Note that the SD card's lock feature was set to the lock position.

The device was attempted to be downloaded using the manufacturer's procedures. The results of the download attempts are outlined below in section 3 of this report.



Figure 1. The Appareo Vision 1000 device as received.

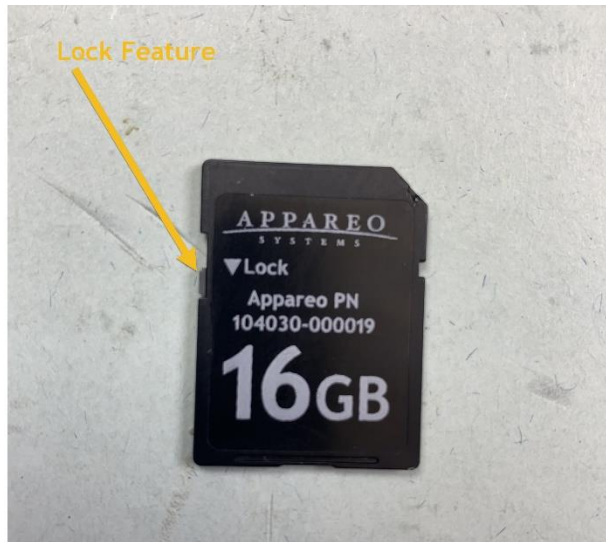


Figure 2. The device's internally mounted, externally removable SD card. Note the lock feature is set to the lock position.

3.0 Data Recovery

The device was undamaged and was first attempted to be read out using the manufacturer's normal procedures. The first step in this procedure is to attempt to access flight data on the SD card.

The SD card's lock feature was set to the locked position as shown in figure 2. When the lock feature is activated on an SD card, the device is protected from data being either written or deleted from the device's memory. When the lock is active, only read-only access to the device's memory contents are permitted.

The SD card data was reviewed and found to be blank. Additionally, a forensic image of the SD card was constructed and examined. The forensic image revealed that there was no data written to the card, and furthermore, there was no data that appeared to be deleted from the card.

The next step in the manufacturer's download process is to attempt to download the device's internal memory. This is a separate memory device which is not user removable and is located within the Appareo Vision 1000 unit. During the internal memory download attempt, the Appareo Vision 1000 unit indicated that it would not properly boot. A number of power cycles and configuration changes suggested by the manufacturer were attempted, none of which resulted in the unit booting successfully. The manufacturer could not explain a failure of the unit to boot. No data could be recovered using the manufacturer's internal memory retrieval process.

Next, a laboratory process using a surrogate Appareo Vision 1000 device was utilized to attempt to retrieve data. In this process, the accident unit's internal

memory board is swapped with a working surrogate device. This process was successful, and the unit indicated that flight data was being retrieved successfully. The unit then indicated that flight data had been successfully retrieved.

The flight data from the surrogate download were reviewed. The download contained flight data with a date range of August 24, 2021, to November 1, 2021. The accident occurred on July 29, 2022, about 9 months after the unit ceased recording files.

Some of the flight data retrieved from the unit contained incomplete flights. These incomplete flights showed the unit either started recording normally and terminated in mid-flight, or failed to start normally and started in mid-flight. Some of the files appeared to be a continuation of previous data files in which portions of flights were not captured at all.

No flight data pertinent to the accident investigation was retrieved from the device.

Submitted by:

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