

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, DC 20594

September 3, 2019

Onboard Image, Audio, and Data Recorder

Specialist's Factual Report

By Sean Payne

1. EVENT

Location:	Flushing, New York
Date:	March 11, 2018
Aircraft:	Airbus Helicopter AS350 B2
Registration:	N350LH
Operator:	Liberty Helicopters, Inc.
NTSB Number:	ERA18MA099

2. SUMMARY

On March 11, 2018, about 1908 eastern daylight time (EDT), an American Eurocopter Corp (Airbus Helicopters) AS350 B2, N350LH, was substantially damaged when it impacted the East River and subsequently rolled inverted after the pilot reported a loss of engine power near New York, New York. The pilot egressed from the helicopter and sustained minor injuries. The five passengers did not egress and were fatally injured. The scheduled 30-minute, doors-off aerial photography flight was operated by Liberty Helicopters, Inc., on behalf of FlyNYON under the provisions of Title 14 *Code of Federal Regulations* (CFR) Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the flight, which originated from Helo Kearny Heliport (65NJ), Kearny, New Jersey about 1900.

3. GROUP

A group was not convened.

4. DETAILS OF INVESTIGATION

On March 14, 2018, the National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following image, audio and parametric data recording device:

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

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4.1. Appareo Vision 1000 Recorder 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 the 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 and records 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.

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.

4.2. Appareo Vision 1000 Damage

Upon arrival at the NTSB Vehicle Recorder Division, it was evident that the Vision 1000 device had been exposed to water. As a precaution, the device was placed in fresh water immediately after it was removed from the accident wreckage and was transported to the laboratory in water. An SD memory card was associated with the device and also transported to the laboratory in water.

Figure 1 is a photograph of the SD memory card as well as the Vision 1000 device after being removed from the fresh water container in the NTSB laboratory.

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



Figure 1. The Appareo Vision 1000 device and the associated SD card, as received. The photographs are not to scale.

4.3. Appareo Vision 1000 Data Recovery

The Vision 1000 device and the SD card were cleaned and dried in accordance with NTSB laboratory procedures. The SD card was returned to a functional state. The separate internal memory from the Vision 1000 was later extracted and read out.

The SD card was read via a PC as per the manufacturer's guidelines. The SD card contained a number of Appareo formatted flight files associated with power cycles of the Vision 1000 device. The most recently recorded file was opened and contained image, audio and parametric data from the year 2014. Specifically, the last data point recorded was on July 1, 2014 at 12:51:41.5 UTC. Imagery contained in this file was not associated with the accident. Figure 2 is a screenshot of a recorded image from the Vision 1000 in the accident helicopter from 2014.



Figure 2. An example image recorded by the Vision 1000 in the accident helicopter from 2014. The pilot has been redacted.

The Vision 1000 device was then disassembled, and the internal memory was removed, read and converted to a useable format. The internal memory's contents appeared to be a mirror of the data recorded on the SD card. Imagery recovered from the internal memory also matched that of the imagery found on the SD card which had a time stamp from the year 2014.

The Vision 1000 device was determined to contain older firmware which had a known fault condition that could result in the unit ceasing to function properly. At the time of the accident, the manufacturer had an update available to correct the firmware deficiency. The accident unit did not contain this firmware update.

Section 3.0 of the Airworthiness Factual Report discusses the Appareo Vision 1000 maintenance requirements and other findings. The following is discussed on page 13 of the Airworthiness Factual Report:

The Appareo Vision 1000 cockpit image recorder was installed on N350LH at the time of its manufacture. The AS350 B2 maintenance manual contained a requirement for a 12-month inspection of the Vision 1000 camera which included functional test of the camera. According to the maintenance records for N350LH, the Vision 1000 camera maintenance was labeled as "N/A" (not applicable) during the last airframe 12-month inspection on October 27, 2017. The operator's director of maintenance

stated they did not know the function of the camera installed on the helicopter until the accident when investigators identified it...

Section 7.14 of the AS350 B2 RFM [Rotorcraft Flight Manual] contains a system description of the Vision 1000 along with a figure that depicts its location within the cockpit. Additionally, Airbus Helicopters Information Notice No. 3022-I-25, dated November 8, 2017, contains information on the Vision 1000 system, its intended use, and the potential benefits of the data it collects. Attachment 1 of this report contains a copy of Airbus Helicopters Information Notice No. 3022-I-25.

The Airworthiness Factual Report can be found in the public docket for this investigation.