

**NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Vehicle Recorder Division
Washington, D.C. 20594**



GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

ERA18IA078

By Sean Payne

WARNING

The reader of this report is cautioned that the transcript of a onboard image recording is not a precise science but is the best product possible from a Safety Board group investigative effort. The transcript or parts thereof, if taken out of context, could be misleading. The transcript should be viewed as an incident investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the transcript as the sole source of information.

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July 8, 2021

Onboard Image Recorder

Specialist's Factual Report

By Sean Payne

1. EVENT

Location: Memphis, Tennessee
Date: January 28, 2018
Aircraft: Airbus Helicopters EC130T2, N894GT
Operator: Air Evac EMS Inc.
NTSB Number: ERA18IA078

On January 28, 2018, about 1400 central standard time, an Airbus Helicopters EC 130 T2; N894GT, operated by Air Evac EMS Inc., incurred minor damage during a hard landing at Regional One Health Medical Center's Rooftop Helipad, Memphis, Tennessee. The commercial pilot, flight nurse, flight paramedic, and patient being transported, were not injured. The flight was operated under the provisions of Title 14 *Code of Federal Regulations* Part 135, as a helicopter air ambulance flight. Visual meteorological conditions (VMC) prevailed for the flight, and a company visual flight rules (VFR), flight plan was filed for the flight which departed from Humboldt, Tennessee, about 1327.

2. GROUP

A group was convened on April 26, 2018, at the NTSB's Vehicle Recorder Laboratory. The group consisted of the following members:

Group Chairman: Sean Payne
Mechanical Engineer
NTSB

Member: Todd Gunther
Investigator-In-Charge (IIC)
NTSB

Member: Bob Hendrickson
Senior Air Safety Investigator
Federal Aviation Administration (FAA)

Member: Pascal Herate
Safety Investigator
Bureau d'Enquêtes et d'Analyses (BEA)

Member: Seth Buttner
Manager – Incident Investigation
Airbus Helicopters

Member: Bryan Larimore
Air Safety Investigator
Safran HE

Member: Greg Houska
Aviation Training Manager
AirEvac

3. DETAILS OF INVESTIGATION

On February 9, 2018, the National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following image recording device:

Recorder Manufacturer/Model: **Appareo Vision 1000**
Recorder Serial Number: **SD Card Only – No Serial Number**

3.1. Recorder Description

The Appareo unit records image, audio and parametric data on a removable SD memory card that is inserted into the unit. 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 crash and fire resistant 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 is connected to the aircraft's battery through the master battery switch. Any time the battery switch is turned on, the Appareo unit will start to record images and data. The Vision 1000 unit creates a new file for every electrical power application. Some of the recorded files are flights and some of the files are just short power cycles of the aircraft's battery.

The Appareo recorder has a self-contained attitude and heading reference system (AHRS) that consists of sensors on three axes that measure heading, attitude and yaw information. The AHRS system consist of solid-state gyroscopes, accelerometers and magnetometers that provide motion information to an on-board processing system which calculates attitude and heading solutions to be recorded in the unit. In addition to the internal sensors, the Appareo Vision 1000 also contains an internal Global Position System (GPS) receiver that provides 3 dimensional position information of Latitude, Longitude, GPS altitude and true track information to the recorder.

In addition to the internally recorded data obtained from the Vision 1000, other parameters were obtained by viewing the aircraft's cockpit instruments. The process used to obtain this data and the resulting data are described in section 3.3 of this report.

3.2. Recorder Damage

Only the SD card from the device was sent to the laboratory and it did not exhibit damage. The card read out normally via a PC and the proprietary files were decoded into images, audio and parametric data using the manufacturer's supplied software.

3.3. Video Files

The SD card contained 232 files from the Appareo device. Most of the files contained only parametric data from previous flights. The last three files contained parametric data as well as image and audio data. The incident file was named "VIS-FGGA-00624.adsp."

3.4. Timing and Correlation

Timing of the transcript is expressed as Video Elapsed Time, which is time from the beginning of the recording. Timing was correlated between the video recording and the Engine Data Recorder (EDR) by aligning the discrete parameter showing the rotorcraft's transition from "flight" to "idle". For additional timing information, see the Engine Data Recorder Group Chairman's Factual report, which can be found in the public docket for this incident.

Therefore, the time correlation exists as the following equation:

$$\text{EDR Time} - 18 \text{ seconds} = \text{Appareo Elapsed Time}$$

Video elapsed times are expressed as HH:MM:SS and HH:MM:SS.00 when more precise timing is needed.

3.5. Summary of Recording Contents

Cockpit Recording

The orientation of the camera's field of view did not include a view of the collective or the collective lock. The camera was unable to resolve an accurate reading of the rotorcraft's NR gauge (rotor rpm) due to the digital nature of the gauge and the sample rate of the image recorder. The rotorcraft was in EMS configuration and the pilot was seated on the left. The camera provided a view over the pilot's right shoulder and forward. Only conversation pertinent to the incident investigation was transcribed. Comments by the pilot and medical crew

are presented as bold text for clarity. [Brackets] were used to illustrate the names of buttons, switches and lights observed in the recording.

The recording began on the ground at AirEvac's base in Jackson, Tennessee. The pilot was going through preflight checks and checklists prior to departure. The pilot's preflight actions were unremarkable and nominal. Visual alerts on the annunciator panel and recorded aural alerts were nominal and consistent with the appropriate phase of flight for the rotorcraft. Specifically, the low rotor RPM horn activated and was unsilenced. The [ENG FIRE] (fire test) annunciator light illuminated with a brief aural tone and extinguished quickly. The [TWT GRIP] (twist grip) annunciator light illuminated appropriately as well as the [HORN] annunciator light. The pilot performed a hover check after lifting off. All flight instruments appeared to behave normally for the appropriate phase of flight. The pilot used the call sign "**AirEvac7**¹" and departed the Jackson, TN, base by 00:07:00.00.

Between approximately 00:07:00.00 and 00:13:50.00, the rotorcraft was en-route for a patient pick up at Humbolt General Hospital in Humbolt, Tennessee.

Around 00:13:50.00, as the pilot was on approach to landing at Humbolt General, the pilot commented, "**this gunna be a really slow approach guys, I'm uh, this is the first time I've flown in an EMS configuration.**" The rotorcraft continued its descent to the landing area.

Around 00:15:27.26, the rotorcraft touched down and pilot stated "**alright, commin' off.**" About two seconds later, a [gong] was heard and the twist grip light illuminated on the annunciator panel. Around 00:15:31, the pilot had moved his left hand out of the region of the collective and onto the cyclic stick, at the same time, his right hand moved from the cyclic to silence the low RPM horn and then reached for a checklist. At about 00:15:32.50, the low rotor RPM horn was heard and was silenced by the pilot around 00:15:35.00. When the annunciator panel came back into view at 15:36.00, the [HORN] light was illuminated.

The medical crew departed the rotorcraft. The pilot remained seated in the rotorcraft and the rotorcraft's engine was still operating while the pilot waited for the medical crew to return with the patient. The medical crew later loaded a patient.

Prior to departure from Humbolt General, the pilot was observed using checklists. Around 00:27:33, an increase in engine noise was heard, an aural tone was heard and annunciator lights extinguished from the annunciator panel. The pilot verbally went through a checklist. The pilot continued to go through the checklist, both of the pilot's hands were visible at this time. Around 00:28:45, the rotorcraft lifted from the pad at Humbolt General Hospital. The pilot performed a pedal turn

¹ At times, it was unclear if the pilot said "AirVac" or "AirEvac 7"

and transitioned into a hover. By 00:29:07, the rotorcraft was departing the area in a climb.

Between approximately 00:29:07.00 and 00:56:39.00, the rotorcraft was en-route for patient drop off at the Regional One Health Medical Center's Rooftop Helipad (The Med), Memphis, Tennessee. The pilot was observed using a checklist while en-route and prior to approach.

Around 00:56:39.00, the pilot began an approach to the Med. Around 01:01:15, the pilot came into a hover above the pad at the Med. The pilot performed a pedal turn to the right and stopped into a hover. By 01:01:45.01, the rotorcraft had made ground contact as the image became stable. About two seconds later, at 01:01:47.76, the pilot stated, "**touchdown.**" Another voice was heard saying "**alright.**" At 01:01:49.01, a [gong] was heard and the [TWT GRIP] light illuminated on the annunciator panel. A half second later at 01:01:49.51, the pilot's head moved slightly right. A quarter second later, the pilot's body began moving right. Another half second later, at 01:01:50.26, both of the pilot's hands were visible in the region of the cyclic. One quarter second later, at 01:01:50.76, the rotorcraft started to become airborne. The rotorcraft appeared to pitch forward and yaw to the right. Although the pilot's hands were not directly visible, they appeared to begin moving in conjunction with the flight controls. At the time of the helicopter leaving the ground, the pilot said "**Whooooah #².**" A voice was heard saying "**Uht oh, uht oh, uht oh.**"

Looking at the positioning of the pilot's hands, the movement appeared to be uncommanded by the pilot. At 01:01:51.01, a green indicator [LIGHT] that had previously be lit (an indicator showing the landing light was on, a switch on the collective) extinguished. A quarter second later, at 01:01:51.26, the [LIMIT] light came on and the pilot appeared to be manipulating the controls while the rotorcraft was airborne over the pad. By 01:01:52.01, the [TWT GRIP] light extinguished from the annunciator panel. One quarter second later, at 01:01:52.26, the [LIMIT] light extinguished from the annunciator panel.

By 01:01:53.26, a vibration in the camera's image was consistent with ground contact, the ELT indicator light illuminated. A sound similar to ground contact was recorded. At 01:01:54.51, the PFD screen's attitude information no longer displayed. By 01:01:57.26, the rotorcraft appeared to settle back on the helipad.

At 01:01:58.01, the pilot exclaimed, "**I don't know what the # just happened.**" A second voice was heard saying "**Okay.**"

Around 01:02:10, the pilot stated, "**who.**" Then he exclaimed, "**# around.**" Some unintelligible commentary was recorded, the medical crew was talking about the patient. Then a voice was heard saying "**Its been a bad day for him.**"

² # - NTSB convention for the redaction of an expletive.

At 01:02:24, the pilot stated, **“holy #.”** At 01:02:27, the pilot stated, **“the collective jumped # up.”**

At 01:02:31, the pilot reached to reset the rotorcraft’s Emergency Locator Transmitter (ELT). A voice was heard questioning, **“you hit so hard your ELT went off?”** The pilot responded, **“ya.”** A voice stated, **“will we have to have it checked?”** the pilot stated, **“I don’t know.”**

At 01:02:47, the pilot stated, **“Alright, the collective lock is on now.”**

Around 01:02:49, a [gong] was heard and the twist grip light illuminated on the annunciator panel. Around 01:02:51, the low rotor RPM horn was heard. Rotor RPM was heard decreasing and the pilot reached with his right hand to silence the horn on the center bezel. The [HORN] light became visible on the annunciator panel as the pilot moved his head out of the line of sight between the camera and the panel.

Around 01:03:00, the pilot stated, **“oh boy”** and later, **“holy #.”**

Around 01:03:18, The pilot called for the engine shut down checklist and was seen holding a checklist. The pilot began verbally reading the engine shut down checklist as follows:

Pilot: **I might wanna erase that part**

Pilot: **Okay**

Pilot: **Engine, engine shut down**

Medical crew: **I don’t know if he’s going to sign this paper now**

Pilot: **Cyclic friction is on**

Pilot: **Collective pitch lock * * *³**

Pilot: **Thirty seconds**

Pilot: *** * search light’s off**

Pilot: **Unnecessary uh off**

Pilot: **Avionics off**

Pilot: **Engine selector off.**

³ * - NTSB convention for an unidentified word or utterance. Up to three asterisks (* * *) are used for the utterance of unidentified phrase or sentence.

Pilot: **Woof**

Pilot: **Generator off**

Pilot: **Rotor brake to one hundred**

The engine spooled down, the pilot activated the rotor brake. The rest of the pilot's and crew's conversations were unremarkable. The recording ended at 01:05:10.01.

Security Video:

The security video is included in this report as attachment 1. The video shows the incident sequence in its entirety. The pitch of the rotor blades can be seen changing as the rotorcraft becomes airborne from the pad. Additionally, rotor coning was observed.