NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, DC 20594

May 1, 2019

Onboard Image, Audio, and Data Recorder

Specialist's Factual Report
By Sean Payne

1. EVENT

Location:	Bakersfield, California
Date:	November 23, 2018
Aircraft:	Cessna 208B
Registration:	N781FE
Operator:	Westair, Inc.
NTSB Number:	WPR18IA030

2. SUMMARY

On November 23, 2018, about 1733 Pacific standard time, the pilot of a Cessna 208B, N781FE, became incapacitated after he reached the airport run-up area at Meadows Field Airport (BFL), Bakersfield, California. The airline transport pilot received minor injuries and the airplane was not damaged. The airplane was owned by FedEx Corporation and operated by Westair, Inc. under the provisions of Title 14 Code of Federal Regulations Part 135 as an on-demand, scheduled cargo flight. Visual meteorological conditions (VMC) prevailed, and an instrument flight rules flight plan was filed for the cross-country flight that was destined for Ontario, California.

3. GROUP

A group was not convened.

4. DETAILS OF INVESTIGATION

On December 28, 2018, the National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following SD card from the image, audio and parametric data recording device:

Recorder Manufacturer/Model:	**Appareo Vision 1000**
Recorder Serial Number:	**Unknown (SD Card Only)**

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 an 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 aircraft.

The Appareo unit records the image, audio and parametric data on a removable SD[1] 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

The memory card was undamaged and functioned normally.

4.3. Appareo Vision 1000 Data Recovery

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 reviewed.

Timing was presented in UTC. All times in this report are given in UTC.

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

4.4. Appareo Vision 1000 Data Description

Parametric Data

Figure 1 is a top down view of the last tracklog recovered from the Vision 1000 device. Point A is where the data originated at 00:20:23 UTC[2] on November 24, 2018. The aircraft began taxiing from point A toward the ramp area around 00:26:10. The aircraft entered taxiway A4 around 00:26:59. The aircraft made a left turn on taxiway A and passed the runup area around 00:29:00. The aircraft taxied to the southeast area of the airport and stopped around 00:32:00 at point B on figure 1.

For the following, refer to figure 2. The aircraft began moving again from point B around 01:29:05. The aircraft moved toward runway 30R and stopped in the runup area at point C just short of taxiway B around 01:32:50. Data showed the aircraft was stopped at point C until around 03:55:00.

The aircraft was then moved back to point A around 03:55:00. The aircraft sat at point A until 17:39:14.

Data ended at 17:39:14.

Video Data

The Vision 1000 system has the ability to record up to about 2 hours of video data[3]. During an operation longer than two hours, typically only the last two hours are retained by the device. Video data was reviewed from the device installed in the incident aircraft. The video showed an empty cockpit until the end of the recording when an unidentified individual entered the cockpit and reached near the instrument panel. The video recording ended upon this individual's action.

Attachment 1 is a comma separated values (.CSV) file of the data recorded that is pertinent to this accident investigation. Due to file size limitations, attachment 1 was curtailed at 03:55:00.

Appendix A describes a list of the Appareo Vision 1000 recorded parametric data parameters and the associated unit abbreviations.

[2] All times are given in UTC.
[3] The amount of video data recorded on the Vision 1000 is dependent on a number of factors which are beyond the scope of this report.

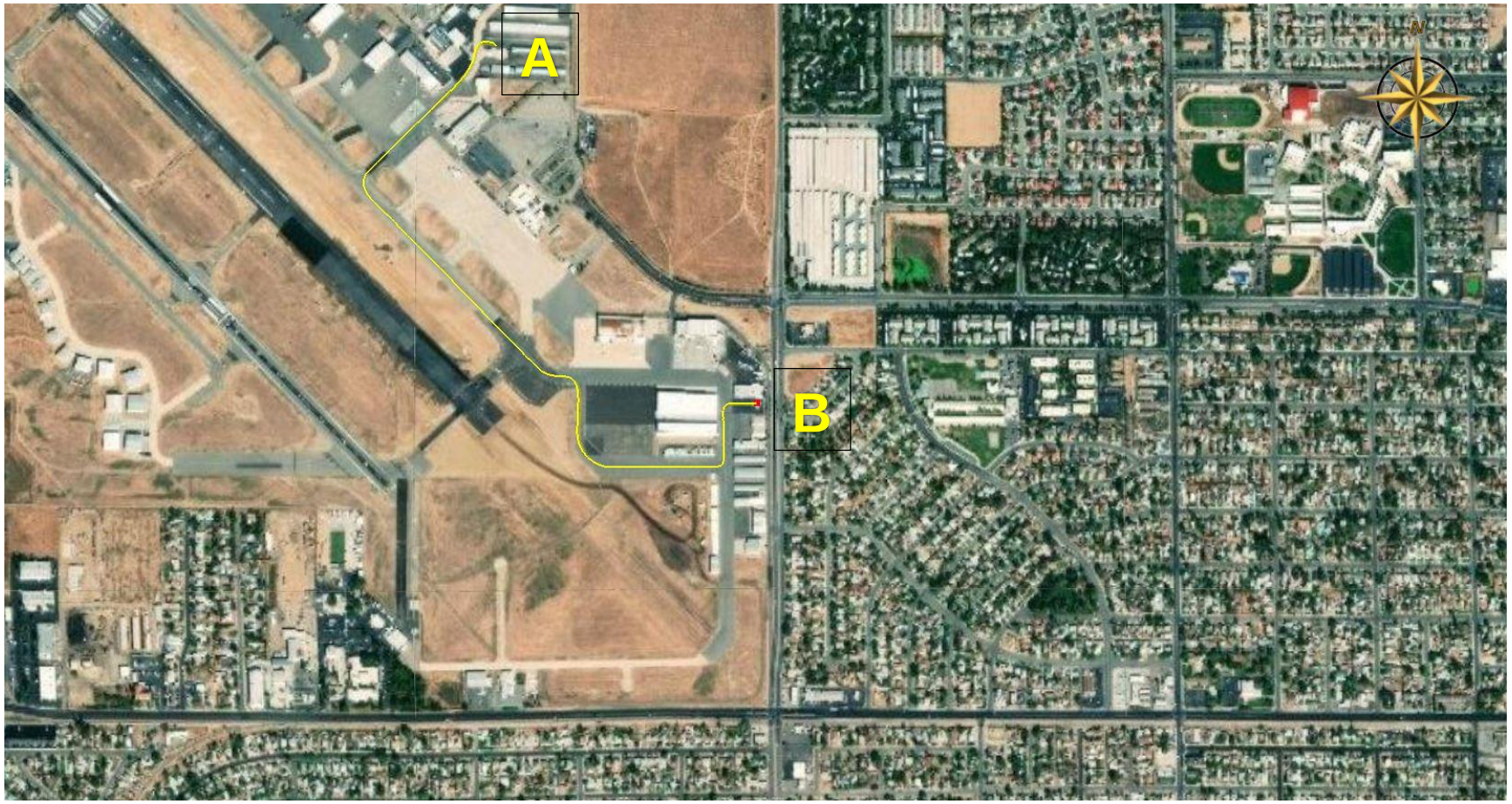

Figure 1. The aircraft's groundtrack between 00:20:23 and 00:32:00 UTC.

Figure 2. The aircraft's groundtrack between 01:32:50 and 03:55:00 UTC.

APPENDIX A

This appendix describes the parameters provided and verified in this report. Table A-1 lists the parameters and table A-2 describes the unit abbreviations used in this report.

Table A-1. Verified and provided parameters.

Parameter Name	Parameter Description
Latitude	Latitude
Longitude	Longitude
Elevation	Altitude
GroundSpeed	Groundspeed
VerticalSpeed	Vertical Speed
Course	Ground Track
Heading	Heading
Pitch	Pitch
Roll	Roll
RollRate	Roll Rate
YawRate	Yaw Rate
NormalAccel	Normal Acceleration
LateralAccel	Lateral Acceleration
Slip	Slip/Skid Indication
TurnRate	Turn Rate
NormalField	Magnetic Field (Z Direction)
LongitudinalField	Magnetic Field (X Direction)
LateralField	Magnetic Field (Y Direction)
Fix	Fix Quality
HAcc	Horizontal Fix Accuracy
VAcc	Vertical Fix Accuracy

Table A-2. Unit abbreviations.

Units Abbreviation	Description
Degrees	degrees
Degrees/Sec	degrees per second
G's	g
Gauss	gauss
2D	two-dimensional fix
3D	three-dimensional fix
DGPS	differential GPS fix
Millimeters	millimeters